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NOTES FOR THE MONTH

Agricultural Marketing Bill, 1933

A NOTE explaining generally the provisions of the Agricultural Marketing Bill, 1933, will be found at page 63 of this issue. In moving the Second Reading of the Bill, on March 13, the Minister said that "the proposals which we bring forward are admittedly drastic, far-reaching and novel, and our only justification for them is that they are not more drastic than the situation demands, that they are not more novel than the circumstances which confront us, and that they are not more far-reaching than the emergency which has brought them into being."

A report of the Minister's speech at Newton Abbot, on March 10, will be found at page 15.

Importation and Keeping of Musk Rats Prohibited

THE MINISTER of Agriculture and Fisheries and the Secretary of State for Scotland have issued an Order prohibiting absolutely the importation into, and keeping within, Great Britain of musk rats. This Order has been laid before Parliament, in accordance with the provisions of the Destructive Imported Animals Act, 1932, and will, unless Parliament resolves to the contrary, come into force on April 1, 1933.

Regulations made immediately after the passing of the Act allowed the keeping of musk rats under licence in pens of approved design and subject to stringent conditions. In view, however, of the risk of escape, which, owing to the human element, no licence conditions can completely eliminate, and of the damage caused by these animals when at liberty, it has been considered necessary, in the public interest, to prohibit entirely the keeping of musk rats in this country.

As from the date when the Order comes into force, any person who imports or attempts to import any musk rat into, or keeps any musk rat in Great Britain, will be liable on conviction to a penalty of £20.

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Artificial Fertilizers in Modern Agriculture

THE monograph on artificial fertilizers, written by Sir John Russell, and issued by the Ministry in October, 1931, as Bulletin No. 28, was evidently published very opportunely. It was at once recognized as a standard work on the subject, and its sale has been rapid, an edition of 2,000 copies having been exhausted in little over a year.

Fortunately, at the close of last year, when the first edition was running out, the records of another year's experiments at Rothamsted and other centres were available, and the author was able to take these into account for his revision. The second edition of this Bulletin,* therefore, contains the latest available information on the subject, which is of vital importance to modern agriculture.

In addition to bringing the previously published accounts of the various artificial fertilizers up to date, the author has included sections on the fertilizing of land for the production of fodder crops, and on the safe mixing of fertilizers generally.

Wild White Clover

THE value of Wild White Clover seed as an ingredient of mixtures for permanent pastures and long leys is well known, and genuine English-grown seed is generally recognized as the most valuable of its kind. Reference has on several occasions been made in this JOURNAL to the certification scheme that has been brought into operation by the National Farmers' Union and the Ministry jointly. The scheme provides for the issue of certificates in respect of seed from (a) "old pastures" that have been laid down for 10 years or more, and (b) fields "once grown" from seed obtained from "old pastures."

The objects of the scheme are twofold, viz., to assist producers in the sale of their seed and to afford a measure of security to purchasers. A more detailed explanation is contained in a leaflet (W.W.1), which may be obtained on application to any branch of the National Farmers' Union. It should be understood that the scheme is open to all growers, whether members or non-members of the National Farmers' Union.

Since the scheme's inception in 1930, an area of some

* Bulletin No. 28, *Artificial Fertilizers in Modern Agriculture* (Second Edition), obtainable through any bookseller or from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price: Art-paper cover, 3s. (3s. 5d. post free), cloth bound, 4s. (4s. 6d. post free).

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7,000 acres has been recorded as qualified for the production of certified seed, 5,000 acres as Grade A ("old pasture") and 2,000 acres as Grade B ("once grown"). Twenty-nine certificates, in respect of nearly 4 tons of Grade A seed, and about $2\frac{3}{4}$ tons of Grade B seed, have so far been issued. Inquiries received from the trade and other sources indicate that there is a potential market for considerable quantities of the certified seed.

Any grower of wild white clover seed who wishes to take advantage of the scheme should communicate *at once* with the County Branch of the National Farmers' Union asking for details and the necessary form of "Application for Field Inspection."

Growers are advised not to delay making application until they intend to take a seed crop as, in view of the necessity for a "growing on" test of a sample of seed from each field, there must be an interval of at least one season between the date of application and the actual "recording" of an approved field. Application for inspection to be made this summer should be in the hands of the National Farmers' Union County Committee *not later than April 15, 1933.*

Report on the Tripod System of Harvesting Fodder and Grain Crops

THE following communication has been received from Mr. James M. Templeton, B.Sc., Principal of the Farm Institute, Sparsholt, near Winchester.

During haytime and harvest in 1932 many farmers suffered heavy loss through the deterioration of crops owing to adverse weather conditions. Such wastage seriously affects, directly or indirectly, the financial returns to farmers by lowering the sale price of hay, straw and grain, and by reducing the nutritive value of these products.

It is claimed that such losses can be avoided by the use of the Tripod Harvesting System invented by Mr. A. Proctor (The Haugh, Blairgowrie). This is not a new principle, but an improvement on the drying racks used in Scandinavia and some continental countries and of the "tramp coles" used for hay in Scotland. Stated simply, the basic principle of the system is the air drying of crops without exposure to the action of the weather. Within 24 hours of cutting, the crops are built into "cocks" or "huts" around a metal tripod, and three ventilating shafts are left on the ground

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level to allow a free circulation of air, which is calculated to dry out the crops in 14 to 21 days, according to weather conditions. The "cocks" or "huts" may be left standing in the field until it is convenient to stack or thrash.

The equipment per acre consists of 6 to 8 metal tripods with one or two wire rings to each tripod, and also three vent constructors (sheets of corrugated iron with rope handles) where loose fodder is being hatted. For hay, clover and lucerne, the tripods are set with a wide span, and two rings (one large and one smaller) are slipped over the tripod to form a strong frame-work. The vent constructors are placed astride each leg and the green fodder is built around and over the tripod and air vent constructors. Care must be taken to get the sides of the hut as vertical as possible, and to finish off with a sharp cone. Two men should be employed in building, using long-handled forks, as the huts are 8 to 9 feet high and hold a small cart-load of hay. After the completion of a hut the vent constructors are withdrawn, but it is advisable to inspect the vent holes at least once and keep them clear; any material drawn out is used to "top up" the hut.

Where corn is being hatted the tripods need not be set so wide, and only one ring is necessary. The huts are made by erecting three small "shocks" between the legs to act as air-vents and building a round base with sheaves, which should be kept as upright as possible. A hut will hold from 90 to 140 sheaves. If the huts are likely to stand out long it is advisable to head them off and to tie the tops down with binder twine.

In connexion with this tripod harvesting method a small sweep or rick-lifter may be worked with horses or with tractor, and it may be used first for collecting the material to build the huts by sweeping the green fodder, or collecting sheaves from the surrounding area. It is subsequently used as a rick-lifter to convey the huts bodily to the stack or thrashing machine. One such rick-lifter worked by a tractor can comfortably keep a full-sized thrashing machine going in the field.

The system was demonstrated last harvest at the Hants County Council Farm Institute, Sparsholt, near Winchester. The crops dealt with were second-cut "seeds," lucerne, wheat, barley and oats, but no costs were kept, as only small plots (altogether about 16 acres) were cleared, and, in addition, the work was mostly done by students. The



Photo : " Farmer & Stockbreeder "

FIG. 1.—Tripod, with one ring, as set for grain. Note completed " huts " in background.

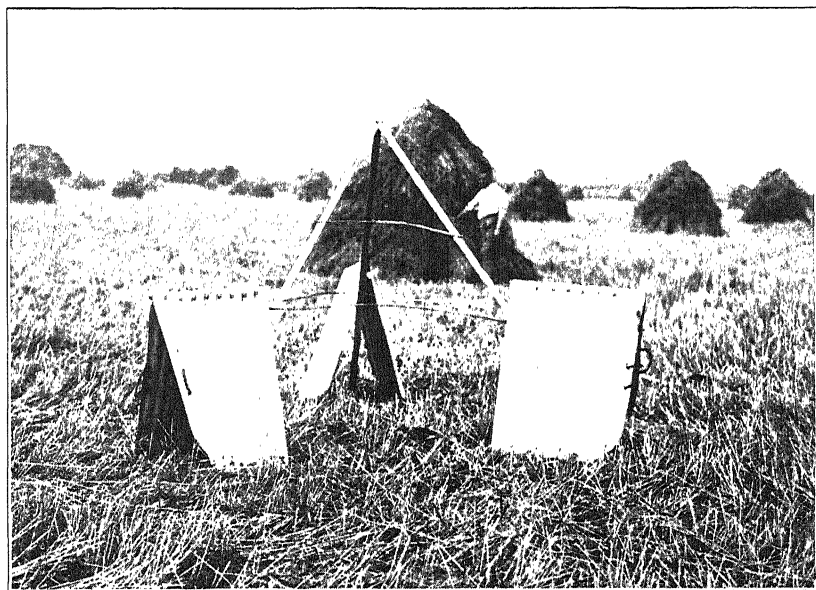


Photo : " Farmer & Stockbreeder "

FIG. 2.—Tripod, with air-vent constructors, set, with wide-spread legs and two rings, for green fodder.

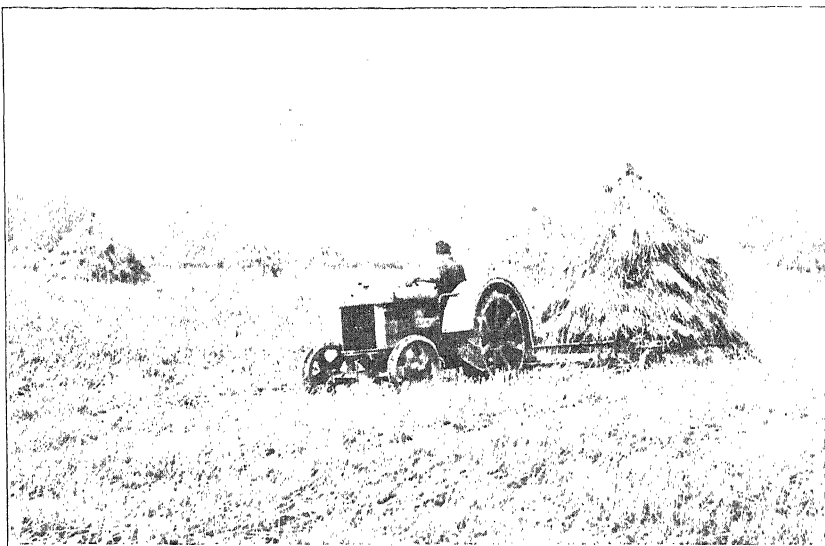


Photo: "Farmer & Stockbreeder"

FIG. 3.—Clearing Tripod wheat "huts" to thrasher, using special rick-lifter.

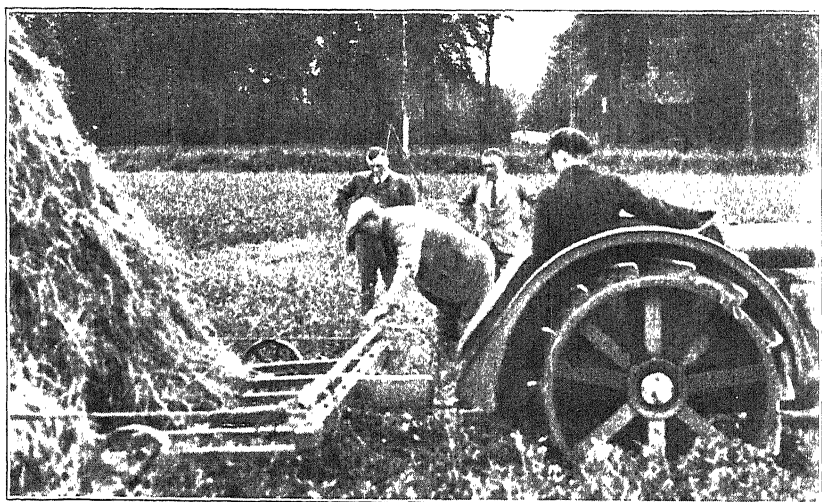


FIG. 4.—Backing rick-lifter under Tripod hay "hut."

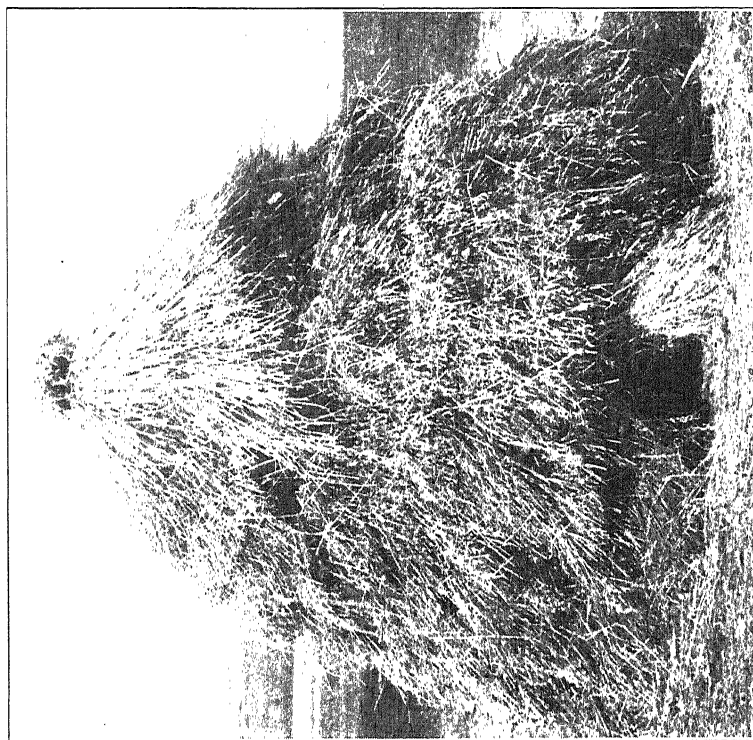


FIG. 5.—Correctly-built, ventilated and topped oats "hut."

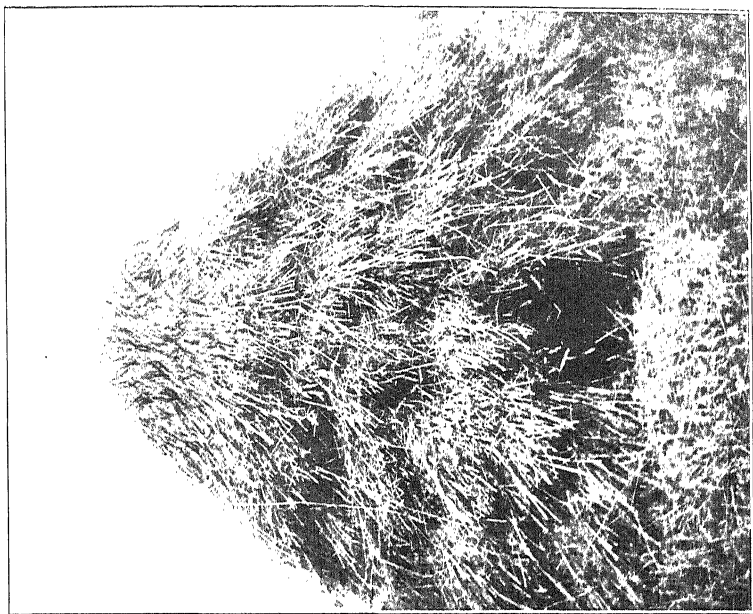


FIG. 6.—Correctly-built wheat "hut," untopped but practically waterproof.

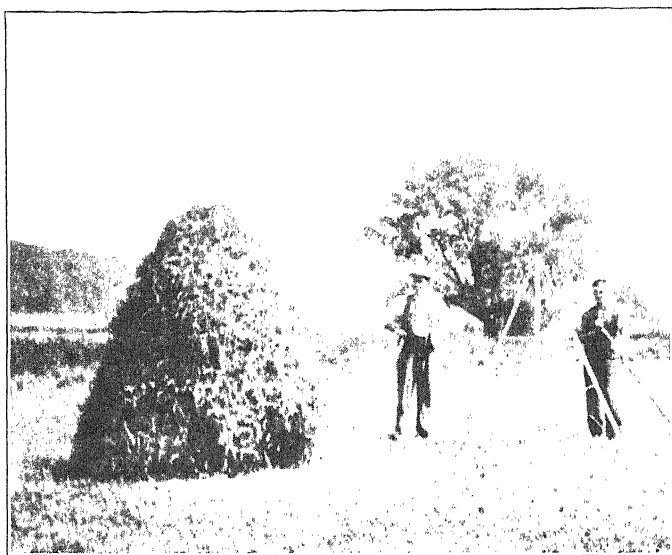


FIG. 7.—How to secure peas under the Tripod system.



FIG. 8.—Correct build for hay, clover and lucerne harvesting under the Tripod system. Note the air-vent and straight sides.

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labour costs would, however, appear to be low, and they are certainly not as high as by the usual methods when dealing with crops in a catchy season, where frequent handling is necessary.

"Hutting" green fodder with tripods when skilled labour is available does not appear to be more expensive than cocking hay, and the removal of the huts was on a par with sweeping. Hutting corn was rather more expensive than "shocking," especially when the huts were headed off to give complete protection against weather and birds. A large sheaf carrier attached to the binder, to enable the sheaves to be dropped in wind-rows, proved advantageous and made collecting easier.

It was shown in the trial that there was no need to worry over unfavourable weather conditions once the crops were hutted. Much of the corn was left out during last September, which was an exceptionally wet month, and the results were highly satisfactory. It was also shown that hay and lucerne retained their natural greenness with all the small leaf preserved, and there can be no doubt about the higher feeding value of such produce for dairy cows and all classes of stock. Remarkably dry samples of grain, ideal for seed and milling purposes, were thrashed out direct from the huts, and the straw was bright and supple. Produce that had been hutted was much superior to that harvested and stacked in the ordinary way.

Conclusions.—1. The tripod harvesting system offers a safe method for securing fodder, grain and seed crops under practically all conditions of weather.

2. The trial at Sparsholt has shown that the system can be very effective under wet conditions.

3. The wheat, barley and oats thrashed straight out of the huts produced hard dry grain suitable for milling or seed purposes, and bright supple straw. There was no loss of grain due to re-handling crops, to loss of rakings or to the ravages of birds.

4. The quality and weight of hay and lucerne were much superior to those obtained by ordinary methods. The system was found particularly suitable for lucerne and clover "seed."

5. The labour required for hutting was not much greater than for ordinary cocking and shocking methods, but some training is necessary to build the hay and grain huts satisfactorily.

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6. Great economy in labour is effected by the use of the rick-lifter for field clearing. With grain, great economy results from direct thrashing from fields.

7. The system does away with the worry and scurry always present in a catchy season. Grain driers are not necessary, and there should be no loss with special seed crops, such as red clover.

8. There is not the same necessity to stack crops rapidly, and during haymaking it would often be an advantage to leave the hay in order to attend to root crops, etc. This may also apply to the corn harvest in special circumstances.

The outlay on tripods and rings amounts approximately to £2 per acre, but it should be remembered that the same tripods may be used for both hay and corn harvests. It is claimed that these tripods should last for 20 or more years, and when not in use they fold up very compactly for storing and transport.

Fish Meal as a Food for Live Stock

THE fish meal industry has made great progress in recent years, and the modern high grade "white fish meal" is a concentrated food of special value to the live-stock feeder. Modern methods of manufacture provide a fish meal that may be used in rations without fear of tainting flesh (of pigs, sheep and cattle), eggs or milk, and there can be no doubt about the food value of the product. Few feeding stuffs are richer in protein; and the protein of fish meal is of a specially high biological efficiency, and exceedingly digestible. The mineral content of fish meal is high, particularly in lime and phosphoric acid. In short, among the feeding stuffs employed in animal industry, fish meal is nearly unique in being composed almost entirely of the constructional materials required for growth.

Considerable quantities of this valuable foodstuff are exported to the Continent, and since many farmers may not be fully aware of the merits of this typically British product, the Ministry has issued a Bulletin* on the subject, written by Dr. H. E. Woodman, of the School of Agriculture, Cambridge University.

Like many other new modern products, fish meal has had to combat tradition on the one hand, and live down the raw errors of its youth on the other, but the "white fish meal" of to-day, sold under that designation, the application of

* Bulletin No. 63, *Fish Meal as a Food for Live Stock*, obtainable through a bookseller or from H.M. Stationery Office, price 6d. (post free 7d.).

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which is restricted by law to a product of a certain standard, has won through after rigorous tests imposed by prominent research bodies, and it now ranks as a feeding stuff of the highest reputation.

The Bulletin describes its manufacture, its composition, its food value, and the results of tests, and proceeds to a detailed exposition of its practical application in the feeding of pigs, dairy cattle, fattening cattle, calves, sheep, horses and poultry.

Asparagus

ASPARAGUS is one of the crops in which interest has been stimulated by the introduction of a tariff on imported supplies, and as many growers have expressed a desire for full information on the growing of this vegetable, the Ministry arranged for the issue of a Bulletin* on the subject.

This publication is based on the reports of investigations made by the Ministry's Horticultural Officers into the methods of cultivation as practised in England, Italy, France, Germany and the United States, and deals with soils and manures, varieties (including selection of desirable strains), seed and crown selection, plant raising, cultivation systems, harvesting, bundling and marketing. Sections are also devoted to the asparagus beetle and the fungus diseases of the crop.

Particularly interesting is the account of the Californian methods for the production of asparagus on a large scale, a mass-production system whereby great quantities of asparagus are produced for canning purposes.

British Exhibits for the World Grain Conference

The Ministry's Exhibit.—In the National Exhibits at the World Grain Conference and Exhibition, which is being held at Regina, Canada, during July and August, 1933, a section will be devoted to a display indicative of the work of the Markets Division of the Ministry in connexion with the National Mark movement for the better marketing of English agricultural products. Specimens of all the National Mark labels in use for the various schemes will be exhibited, together with a selection of the pictorial display material as issued to the distributive trades. Literature relating to the National Mark schemes will be available for distribution. A series of photographs will illustrate marketing

* Bulletin No. 60, *Asparagus*, obtainable through a bookseller or from H.M. Stationery Office, price 1s., by post 1s. 2d.

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demonstrations and displays of National Mark produce given by the Ministry at agricultural shows, exhibitions and National Mark shops.

The Rothamsted Exhibit.—Specimens of wheat, from ground which has been cropped with wheat for 89 years in succession, will be one of the interesting features of an historical and educational exhibit which, under the personal supervision of Sir John Russell, is being arranged by the Rothamsted Experimental Station, Harpenden. It is expected that the exhibit, which will also demonstrate, by models and graphs, the results of extended research into the cultivation of potatoes, mangolds and other crops, will be presented by the Rothamsted Station to a Canadian University at the conclusion of the Conference.

Other British Entries.—From the United Kingdom, some 50 entries have already been received for the competitive classes in which prizes, amounting to £25,000, are offered. British manufacturers are also exhibiting machinery and other products in the Trade Section. This is the first occasion on which an exhibition of British goods has been displayed as far west in Canada as Regina, and it is hoped to be able to arrange for an annual exhibition there.

At the Conference, experts from 20 grain-producing countries will pool their knowledge on all questions affecting the production and marketing of grain.

A Census of House Martins: Are their Numbers Decreasing?

THE following communication has been received from Mr. W. B. Alexander, M.A., Director of the Oxford Bird Census:—

It is a common belief that the numbers of Swallows and Martins in England are gradually decreasing. Those who hold this view generally support it by instances of farms or houses where many of the birds formerly nested, but where few or none have been seen in recent years. Yet it is not difficult in most localities to find nests of Swallows or Martins in sheds or on houses only recently erected. Do these nests on new buildings, or in new situations, make up for the undoubted decline in many old colonies?

The only method of settling this question is to make a complete survey of a definite area and to repeat it after a sufficient interval. At the suggestion of the Ministry of Agri-

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culture, the Oxford Bird Census made such a survey in regard to House Martins in the summers of 1931 and 1932, and, although it is too early yet to answer, with any confidence, the question that heads this article, certain interesting facts emerge from the results obtained.

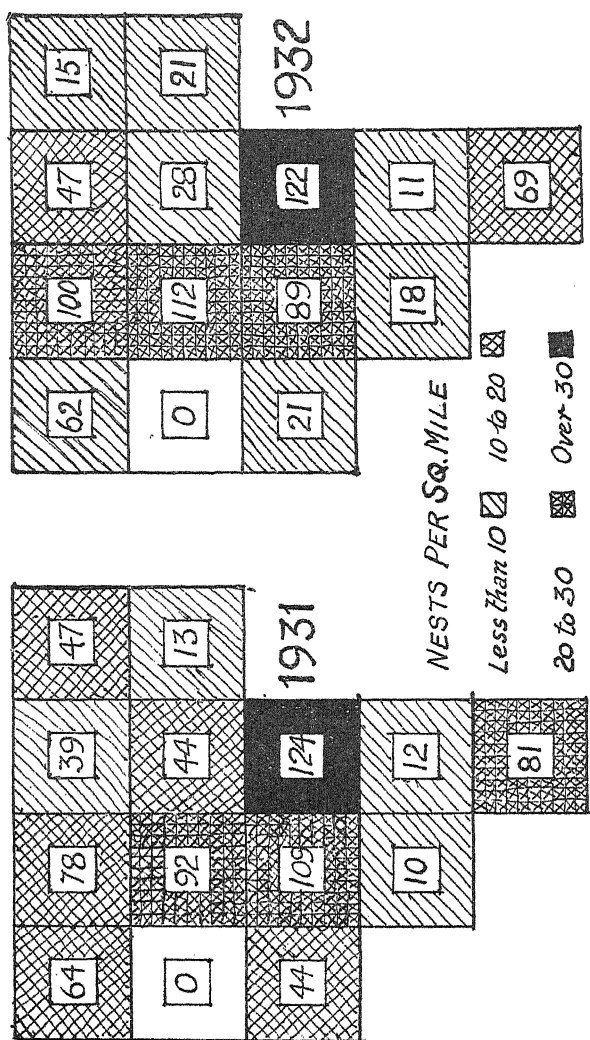
The method adopted was to ask each person taking part in the survey to cover one (or more) squares on the popular edition of the 1-in. Ordnance Survey Map, on which each such square represents 4 sq. miles. In this way, 14 squares, with a total of 56 sq. miles, were surveyed. In 12 of the 14 squares, the same individual made the survey in both summers.

The first problem, of course, was to locate the nests. During the breeding season, especially when they are feeding their young, the birds do not appear to travel far from their nests and are constantly in the air, so that their presence is a clue. In some instances, however, it is by no means easy to locate the nests. Occasionally, they may be in positions almost concealed from the ground, among gables, or under deep eaves or thatch, invisible except from a position immediately underneath. One was actually located in a pigsty. In these circumstances, some nests were doubtless overlooked. In the 1932 survey, three colonies were discovered that had undoubtedly existed in 1931 but had not then been observed. One was at a farm, at the junction of two of the squares, which had not been visited in the first survey of either of them; one was on buildings within the wall of a factory; while the third was on a house hidden from the road by trees. The numbers counted in 1932 at these three places were accordingly added to the numbers of the 1931 survey.

A second serious difficulty in many instances was to determine how many of the nests were actually occupied by their builders and from how many they had been ousted by House Sparrows. Protruding straws commonly indicate most of the nests occupied by usurpers, and a little watching usually shows which nests are still being used by the House Martins.

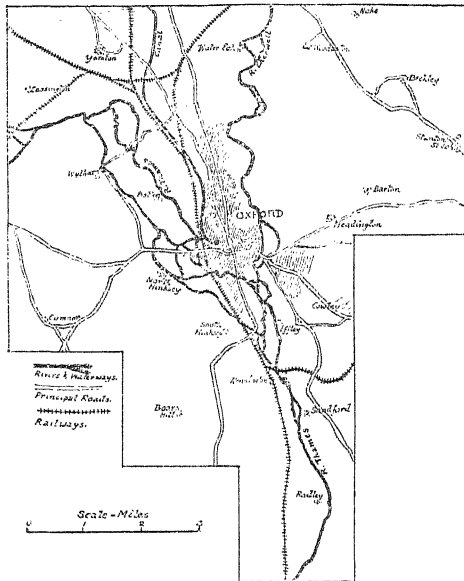
It is highly probable that, in both years, a certain number of nests escaped attention, and that a number of nests, counted as in the occupation of Martins, were really tenanted by Sparrows or had been deserted for other reasons. These two errors are in opposite directions, and

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Census of House Martins. Figures show the number of nests in each square of 4 sq. miles.

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Sketch map of the area covered in the Census of House Martins.

perhaps cancel each other out, so that the results obtained should not be far from the actual fact.

The numbers of House Martins' nests counted in each square in 1931 and 1932 are shown in the accompanying diagrams, and it will be seen that the distribution of the population in the two summers was very similar. The total number of nests counted in 1931 was 757, including the numbers in the three colonies that, as mentioned above, had been overlooked in that year. The total number counted in 1932 was 715.

A reference to the accompanying map will show that the City of Oxford is situated in three of the squares, which may be regarded as mainly urban in character, whilst the remaining 11 squares are predominantly rural. If these areas are considered separately, we find that the three urban squares, with an area of 12 sq. miles, had a population of 325 pairs in 1931 and 323 pairs in 1932. Thus, the urban population remained constant with a density of about 27 pairs per sq. mile. The 11 rural squares, with an area of 44 sq. miles, had a population of 432 pairs in 1931 and of 392 pairs in 1932. This gives a density of about 10 pairs per sq. mile in the former year and about 9 pairs per sq. mile in the

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latter. It is possible that the apparent small decrease was due to nests overlooked in 1932, but when the figures were analysed it was found that there was a decrease in almost all the villages farthest from the City, whilst certain areas that are becoming suburban showed an increase.

Writers who have discussed the alleged decrease in the population of Swallows and Martins frequently attribute it to the tarring of the roads, which is supposed to prevent the birds from obtaining adequate supplies of mud for nest building. If this were the reason, one would expect it to affect the urban population more than birds in rural districts. Yet we have seen that, in Oxford, the population of House Martins is three times as dense as it is in the rural area surrounding it. Oxford may be exceptional in that it has an abundant series of waterways, and figures for comparison from some city without a river would be of much interest in this connexion.

The apparent decline in the population of House Martins in the rural area in 1932 was certainly not due to lack of mud when the birds were building, since the early summer was exceptionally wet and mud was abundant everywhere.

It is not improbable, of course, that the population of these birds fluctuates from year to year and that little importance can be attached to changes occurring in successive seasons. If means can be found to continue the work of the Oxford Bird Census for a further period of years, future surveys, at intervals, on the same lines, should enable a definite opinion to be formed as to whether the population of House Martins is really decreasing.

Agricultural Scholarships

THE MINISTRY invites applications for the undermentioned scholarships which are being offered for award this year under the scheme of scholarships for the sons and daughters of agricultural workmen and others:—

- 130 *Junior Scholarships* (including 10 Extended Junior awards for those who have already held Junior Scholarships) tenable at farm institutes for courses not exceeding one year in agriculture, horticulture, dairying or poultry husbandry.
- 5 *Senior Scholarships* tenable at agricultural colleges or university departments of agriculture for diploma or degree courses in agricultural subjects or at veterinary colleges for courses in veterinary science.

Candidates for Scholarships must be:—

- (a) sons or daughters of agricultural workmen or of working bailiffs and smallholders whose means are comparable with those of agricultural workmen; or

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- (b) *bona fide* workers in agriculture; or
- (c) sons or daughters of rural workers whose means and method of livelihood are comparable with those of agricultural workmen.

The Scholarships cover the whole cost of instruction and maintenance while students are in residence at the institutions. Selection is by interview and not by written examination, but candidates must be able to satisfy the Selection Committee that they are in a position to derive educational benefit from the proposed courses of instruction, and that they intend to take up an agricultural pursuit after receiving the training covered by the award.

Full information concerning the scheme, including forms of application, may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, or from the offices of county councils. The latest date for submitting applications is April 30, 1933.

The Maynard-Ganga Ram Prize

PARTICULARS concerning the proposed second award of the above Prize were given in issues of this JOURNAL for July, 1931 (p. 446), and September, 1932 (p. 584). The Prize, of the value of 3,000 rupees, is awarded every third year for a discovery, or an invention, or a new practical method, which will tend to increase agricultural production in the Punjab, India, on a paying basis, the prize-money being derived from a fund of 25,000 rupees given to the Punjab Government, in 1925, by the late Sir Ganga Ram, C.I.E., M.V.O., of Lahore. The competition for the Prize is world-wide, and Government servants are eligible to compete for it.

The closing date for applications for this second award was December 31, 1932. The response was, however, so poor that the Managing Committee of the Prize decided that the award should be deferred for a further year; and applications for this second award may, in consequence, be sent in to reach the Director of Agriculture, Punjab, Lahore, India, on or before December 31, 1933.

It may be mentioned that the first award of the Prize was made to Dr. C. A. Barber, of Cambridge, for discoveries resulting in the production of Coimbatore seedling sugar canes, which have proved to be much higher in yield, under Punjab conditions, than the old indigenous varieties.

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World's Poultry Congress, 1933

THE Fifth World's Poultry Congress will be held in Rome from September 6 to 15 next. A committee has been formed, under the chairmanship of Captain the Hon. C. K. Greenway, for the purpose of organizing the representation of the British poultry industry at this Congress. As no Government grant will be available towards the cost of staging a national exhibit at the Congress Exhibition, the British Committee has to obtain from voluntary sources the funds required for this purpose.

The task of the Committee is to arrange a programme of papers by leading scientists and others engaged on research and educational work in connexion with the industry in this country, and to stage a national exhibit to represent the industry at the Congress Exhibition. This exhibit will consist of (a) a collection of scientific and educational exhibits designed to demonstrate the excellence of British poultry live stock and the means which have contributed to produce that excellence; and (b) an exhibition of live poultry, rabbits and possibly pigeons, selected from the stocks of the best breeders in the country.

Throughout the world great interest is being shown in the Congress. It is hoped that new openings for our export trade in live stock may materialize as a result of contact with visitors from such countries as Austria, Bulgaria, Czechoslovakia, Egypt, Greece, Hungary, Palestine, Poland, Roumania and Yugoslavia. At this Congress British breeders will have an opportunity of meeting buyers who were unable to travel to London in 1930.

The basic type of the poultry in Italy is the Leghorn. Its quality, however, does not correspond to the Leghorn which has won such a splendid reputation throughout the world, for in Italy itself during a long period the native stock has been crossed with foreign breeds without definite plan with the result that typical breed characteristics have largely disappeared.

Visitors from this country will be able to obtain a second-class return ticket to Rome, with reservations and meals *en route* and including full board and hotel accommodation for ten days in Rome, for £20 5s. For first-class travel throughout and Grade A hotel in Rome the cost is £27. Further information, including full particulars of many attractive excursions, can be obtained from the Secretary of the British Committee, Mr. W. E. Walters, at 10, Whitehall Place, London S.W.1.

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SPEAKING at Newton Abbot on Friday, March 10, Major Walter Elliot, Minister of Agriculture and Fisheries, said:—

The responsibility of governments is great to-day and the responsibility of persons even greater than that of governments. We see, week by week, almost morning by morning now, new governments coming into existence in Europe, in Africa, in Asia, and in America. The hallmark of these governments is a desire to have done with the old ways, a recognition that the methods which served in the past are impotent to grapple with the critical situations of the present day, and to demand from the nations that the internal differences which have divided them in the past should be subordinated, for the time at least, to the necessity for meeting the great crisis which is marching upon the world. At such moments half measures are their own condemnation. We cannot drift; we must at all costs get steerage way on the ship. It has truly been said that the more drastic the measures proposed, the more widely they will find agreement amongst the populations.

It was in recognition of such a crisis that the National Government was formed and that it obtained its unprecedented majority from the people of this country. It claimed, and rightly claimed, a free hand from the people, though even then I doubt if we all realized how free that hand would have to be and the scope of the world problems which we should have to consider. Nowhere has this been more true than in the industry of agriculture. Agriculture, the most ancient of all the arts of man, seemed to be in this country the one most certainly doomed to collapse and almost to extinction. Why was this so? During many hundreds of years the people of this country had tilled fertile soil, and from it, with skill, stubbornness, patience and ingenuity, had drawn crops, flocks and herds which were the admiration of the whole world. Of late years some paralysis appeared to be coming across the countryside. Yet the land was not less fertile, the people not less skilled, the growth both of grain and of beast not less vigorous. What, then, was the cause? It was one of prices. This in its turn was connected with the problem of transport. Almost from the beginning of time the great bulk of agricultural produce, and the fact that it would not keep, had

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demanding that production and consumption should go together, that meat and milk, and even bread and beer, should be used where they were grown. Even in the earliest years tin could be carried from Cornwall to the Mediterranean. Copper and iron and gold could be hoarded and used centuries thereafter. Milk, however, began to go almost from the moment that it hit the milk pail, while meat was so perishable that every winter a scarcity occurred.

In the 19th century all that changed, and changed almost in the twinkling of an eye. The steamships and the railroads came, and on their heels came the scientist who was able to make perishable goods permanent. The use of cold storage meant that the natural protection, upon which all, even Free Traders like Cobden, had relied to safeguard home agriculture, had finished. My own grandfather went from his farm over the Borders to Glasgow to see the first refrigerator at work. He came back and his sons asked him what he had seen. "I have seen my finish," he said. It did not take place for half a century, but what he and others had foreseen has come to pass.

For many years this was masked by the fact that since it was in Britain that all these engines had been discovered, it was in Britain that they could best be made. By the export of coal and iron and steel, of ships and looms, and railroads and every kind of plant, our people were busy, and our enormously expanded population was hard at work, even though there were no more men in the fields. That process, too, has begun to end. Nation after nation, continent after continent, has said: "We are not willing that Britain should be the workshop of the world; we shall make these things for ourselves." This means a very revolution in world trade—and upon world trade hangs world currency, so that we see the chaos of the Exchanges which is intensified in the news in every morning's newspaper. Are we on the pound, on the dollar, on the franc? Are we on gold or on silver or on nothing? We are off the gold standard and the world is off the gold standard, for the gold standard cannot hold while Britain and so many countries freely associated with her are off it. We are off the standard of gold, and for the time being—and it may be for long enough to come—the standard of goods has taken its place. If we are on goods, then that is the meaning of the trade

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conferences and trade agreements which we have embarked upon during the past year. It was started at Ottawa; it is in full and active operation to-day in London. To-morrow it may spread to other countries and other capitals.

Now in all these trade negotiations agriculture is most vitally interested. For many of the staple agricultural products this country is not only *a* market, it is *the* market. It is the world market for bacon; 96 per cent. of the export bacon of the world comes to these shores. It is the world market for mutton and lamb: 94 per cent. of the world's exports of mutton and lamb come here. It is the world's market for cheese: over half the world's export of cheese has to be sold in Great Britain. It is the world's market for butter: out of every 10 tons of butter exported in the whole world, more than 8 tons are sold and eaten here in Great Britain. Now for years, as world production increased, greater and greater quantities of agricultural produce have been hurled upon the markets of this country. The bacon imports into this country rose even in the last three years from 414,000 tons to 570,000 tons. The butter imports, which in 1930 were 341,000 tons, were 403,000 tons in 1931, 422,000 tons in 1932, and it is estimated that the world wants to sell us 450,000 tons in 1933. A great proportion of that, as we know, comes from the Empire. A quarter of it comes from Denmark; between one-third and one-half comes from Australia and New Zealand. We only make one-tenth of our own butter here at home. Yet butter works with cheese and cheese works with liquid milk. These huge supplies of dairy produce, as we all well know, dam back one upon the other, so that we realize the anxiety which the milk producers all over the country, and especially here in the west, feel about the course of prices in the coming year. It is said that we can control these matters by means of a tariff. The man who says he can control the butter situation with a tariff is not talking sense. Nearly half our supplies, as I have shown you, come from the Dominions, to which a tariff cannot be applied. Even as to the quarter that comes from Denmark, a break in the Danish Exchange, such as we have seen in the last two or three weeks, is enough in an afternoon to wipe out the whole protective value of the present increased tariff, and turn it into a subsidy.

The position in butter is one which can be paralleled in

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half a dozen other agricultural products. The Government realized that organization of the market, both for home and overseas supplies, was the only way to tackle this question. If we are to tackle prices, we must tackle quantities, and if we are to tackle quantities, then the simplest and most straightforward way is to tackle them as such. The principle upon which we tackle them must be that of recognizing that this country, as I have said, is a world market. Our watchword must be to obtain a remunerative level of prices. You ask me what a remunerative level of prices is. I say it is a price which allows for replacement of the article which has been consumed. However you juggle with facts and figures, it must remain that an article being sold below the cost of production is an article which sooner or later will bankrupt the producer, and the bankruptcy of the producer is the swiftest way to either the bankruptcy or the starvation of the consumer, and very possibly both. For this purpose, therefore, we have been investigating, product by product, the agricultural problem of this country and the supply of the markets of Great Britain, from which it cannot be severed. For this purpose we set up a Bacon Commission. For this purpose we set up the Milk Commission. For this purpose we introduced this week into the House of Commons the Agricultural Marketing Bill, and for this purpose on Monday we are bringing it up for its Second Reading. What the Marketing Bill says in a nutshell is this. We must organize the home market, and the supplies to that market. If and when, however, the industry undertakes so to organize, it must be guaranteed that it shall not be swamped out by an unorganized flood of produce landed on our shores in a succession of bankrupt sales. Furthermore, it says that the producer is not merely interested in growing his product, but in what is done with it thereafter, and that he and the manufacturer can full well come together to organize the secondary products, the processed foods, the outlets for gluts and surpluses of all kinds which are becoming every day more important in every walk of industry.

These are very great projects and if it were a case of a leap in the dark, it would be a formidable leap—but it is not so. We are in a way fortunate that owing to the crisis of last autumn the livestock situation had to be grappled at short notice and by voluntary agreements. This meant

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that at least we were able to avoid the stereotyping effect of legislation, and the time so gained for experiment has been of the utmost value to the whole country. As you will remember, the meat prices last autumn were falling in a way which none of us had ever experienced before. Beef prices, which had held up even during the slump of the preceding years, were falling to a terrifying extent. Sheep prices were simply going straight down. What is more, the market was showing signs of glut, an unwillingness to absorb supplies at any level of prices. The restrictions were arranged and, without question, the fall in prices stopped and a rise in prices has since taken place. I am not forgetting that a seasonal rise in prices is due after Christmas. I can only say that those who are best qualified to judge said that they could see no prospect whatever of the seasonal rise in price taking place this year, and that all they could anticipate was a further fall. For that is the effect of glut. We have seen it in one great commodity market after another. When prices really begin to fall weak selling begins. The normal seasonal rises in price movements do not take place at all. Some say a tariff would have done it as well. I do not think so, and that for the same reason as I have already explained in the case of butter. When there is only one purchaser—and remember we are a purchaser of 94 per cent. of the world's mutton and lamb export, and 100 per cent. of the world's chilled beef export—a fall in prices leads not to a holding back from the market but to a panic rush to the market. Last autumn good fresh meat was going to the soapworks at $\frac{1}{2}d.$ for 8 lb. That was the extent of the panic.

The stopping of the panic had a further result. It reinforced the good relations which already existed between the industry and the Ministry to a remarkable extent. That solidarity has never been as great as it is now and has never been as necessary. Great demands for organizing power and executive ability are about to be made upon the industry of agriculture. It is vital that at this moment it should have confidence in the Office at Whitehall and be able to draw freely, as it is doing, upon the reserves of experience and assistance which are available there.

Take the case of the bacon industry alone. The Lane-Fox Commission worked out a scheme for the reorganization of the bacon trade. The pig meat trade is worth £85 million

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a year altogether. It is bigger than the whole periodical and newspaper industry of this country. Between October and July the whole of that reorganization has to be explained to the producer, worked out in detail, accepted by him, and put into force. If it can be done—and it is being done—it will be one of the swiftest reorganizations of any trade put through in any country.

Take again the dairy industry. The total value of milk, butter and cheese consumed in this country is £113 million. The total of milk and milk produce sold off our farms in Great Britain is over £1 million a week—£55 millions a year. The Milk Reorganization Commission only reported last month. Its proposals are under active examination now. Yet we know that unless action is taken in the milk industry before the autumn—and long before the autumn—the milk industry will be faced with a crisis not less grave than the crises which have come to other branches of agriculture. I am therefore more than glad to see that farmers in all parts are pressing on with the consideration of the marketing scheme for milk, which is part of the Report, without waiting for an announcement upon the larger questions of policy which that Report raises.

We, the Government, realize that a pronouncement on the further questions of policy which the Commission raises must be met at an early date, and we shall not shirk these decisions. The best earnest of that is the active negotiations in which we have been engaged with the Dominions upon the butter situation. These questions, of course, are intimately bound up with the trade negotiations which are being conducted with foreign countries also, and I can guarantee to you that the interests of agriculture in those negotiations are not being neglected by the Government. In this connexion I should like to pay a special tribute to the President of the Board of Trade, one of the West Country members who has given such great service to his country in the fields both of business and of Government, and is now rendering her services more important, I think, than any he has ever undertaken before. Mr. Runciman is himself an old Minister of Agriculture, and his services in all this work have been beyond praise.

Such then is the situation as I see it. Both at home and abroad it is not stationary; it is moving with an almost dangerous velocity. The business of 1933 is to get control

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of this velocity. By the Marketing Bill, by the emergency tariffs, by the Wheat Quota Act, we are taking the necessary steps. The chief necessity of all is confidence: confidence not only in ourselves but in each other. We in London ask for the confidence of the country-side and will do our best to merit it. We have to work together, the Ministry and the industry, the producers and the distributors, the country and the town. We are embarking on a very great adventure, not merely the rebuilding of agriculture as an industry which shall support itself and its people, but in playing our part as a unit in confronting the new conditions of our day. To meet these conditions there is being born a strong and adventurous spirit in the countryside. We rely on that spirit, and it will not fail us.

NEW METHODS OF PLANT-BREEDING : INDUCED POLYPLOIDY

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WE live in an age of specialization. The old philosopher's day, when a wise man knew everything about everything, is over. In recent years, research has progressed so rapidly, and in so many directions unthought of by previous generations, that the expert, far from aspiring to universal wisdom, has given up all hope even of knowing everything about his own subject.

Now this state of affairs brings with it a number of grave difficulties. One may say that it is very gratifying that our research workers are accumulating such vast stores of knowledge about so many different subjects; and so it is, but what are we to do with this knowledge? Try as the expert will, it is impossible to divide knowledge into watertight compartments, and one field of research is bound to find itself in dependence, sooner or later, on developments in some other field. The biologist finds himself confronted with mathematics—has not the statistician come to be looked upon as the particular bane of all biological study? The plant breeder who wants to make any real advance, after having reached the limits of the old methods of selection and cross breeding, is nearly sure to be confronted by some problem which is fundamentally cytological in its nature.

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I will illustrate this by an example. Wheat breeding has been practised for hundreds of years. At first, consciously or unconsciously, selection was practised by the cultivator, who chose superior ears for seed. Then, after the rediscovery of Mendel's laws in 1900, a campaign of hybridization set in and has continued to the present day. This method of breeding has been an unqualified success, and in some countries has led to an increase of 50 per cent. and more in the yield of wheat per acre. It has also taught breeders many lessons, one of the most unpalatable being that while the creation of new varieties with any desired combination of some characters by hybridization is merely a matter of time and patience, yet the attempted introduction of certain other characters results only in failure. With the minimum of skill, for example, a breeder can introduce awns into an awnless variety of common wheat and vice versa. Why, therefore, have all attempts so far failed to produce by hybridization an awnless variety of the so-called hard wheat (*Triticum durum*) in other respects equal to that of the awned forms in cultivation? This apparently simple question brings us face to face with a problem of cytology. The hard wheat and the common wheat belong to different species, the latter being known as *Triticum vulgare*, and until quite recently awnless forms have not been found in *T. durum*.* Here the specific difference is concrete and fundamental, namely, a difference of chromosome number.

Now the chromosomes are the organs that are responsible—as is now proved by an incontrovertible body of evidence—for the transference of the hereditary characters of the plant. They take the form of minute thread-like bodies within the nucleus of the cell. They can be distinguished only at certain periods of the life of the cell—cell division—and then only under extremely high powers of the microscope. In spite of their minute size, they are the most important bodies with which the breeder has to deal. Each plant has a definite number, it may be three, it may be over 50, and this number is usually characteristic for the species. The chromosome sets of the cells of two plants characterized by low and high numbers are illustrated in Figs. 1 and 2, respectively. We have reason to believe that each chromosome preserves its identity during

* Vavilov, N. I. *et al.* "The Wheats of Abyssinia and their Position in the General System of the Wheats." Suppl. 51, *Bull. Appl. Bot. Genet. & Plant-Breed.*, 1931, 236 pp.

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Fig. 1. Cells of plants characterized by low chromosome number—
Hawksbeard: right 3, left 6.
From *A Cytological Study of Haploid Crepis Capillaris Plants* (Lillian Hollingshead). By permission of the University of California Press.

the whole life of the plant and is responsible for a particular group of hereditary characters. In the reproductive cells of a normal plant (the male pollen cells and the female egg cells) each chromosome is different from all the others—different in the hereditary characters (or factors for characters as we choose to call them) which it carries and, in many instances, different even in shape or in size. When fertilization is effected by applying the pollen of one flower to the female organ of another, two of these cells unite and result in a new cell with twice as many chromosomes as the reproductive cells contained. From the multiplications of this cell a new individual arises.

Always, therefore, each cell of the mature plant contains twice as many chromosomes as each reproductive cell, being composed of the chromosome sets of both male and female parents. These chromosomes are seen to unite in pairs and, in plants whose individual chromosomes differ in size, it is seen that the ones of corresponding size from the two parental cells pair with each other. (Fig. 3.) The chromosomes that pair are therefore called homologous chromosomes (1 and 1', 2 and 2', etc.). The homologous chromosomes entering into fertilization may contain identical hereditary factors, as in the union of a male and female nucleus from the same plant of a pure line, or they may differ in some of the factors, as in a cross between two different types of individuals of the same species.

The new individual resulting from this fertilization keeps the double chromosome number until reproductive cells are formed anew, when the old number is again arrived at by a process in which the homologous chromosomes separate and enter into different cells, without previous division.

From this very brief description of the reproductive processes, it will be gathered that when the two cells entering into fertilization contain different chromosome numbers, the smooth working of the process as described above becomes

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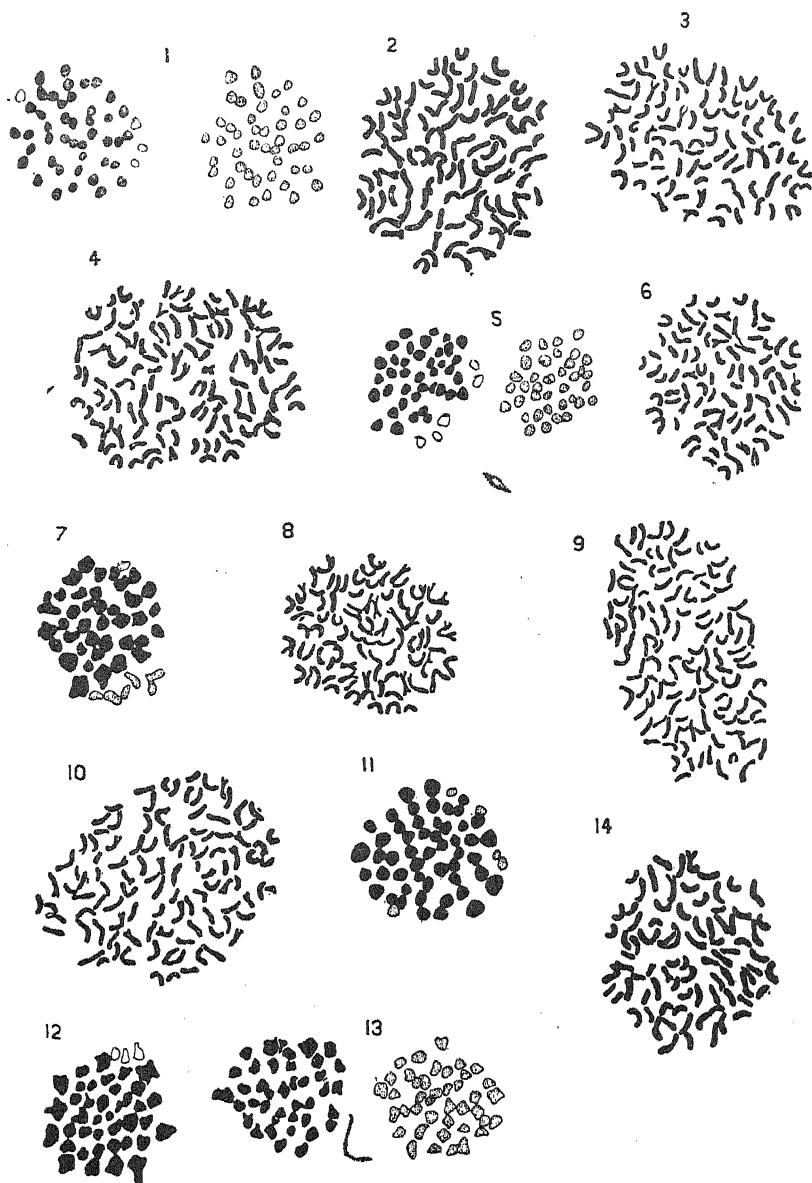


Fig. 2. Plants characterized by high chromosome number.
Cells of different varieties of sugar-cane.
From *De Cytologie van het Sinkerriet* (Dr. G. Bremer). By permission of
the Director of the Testing Station of the Dutch East Indian Sugar
Industry.

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REPRODUCTIVE CELLS

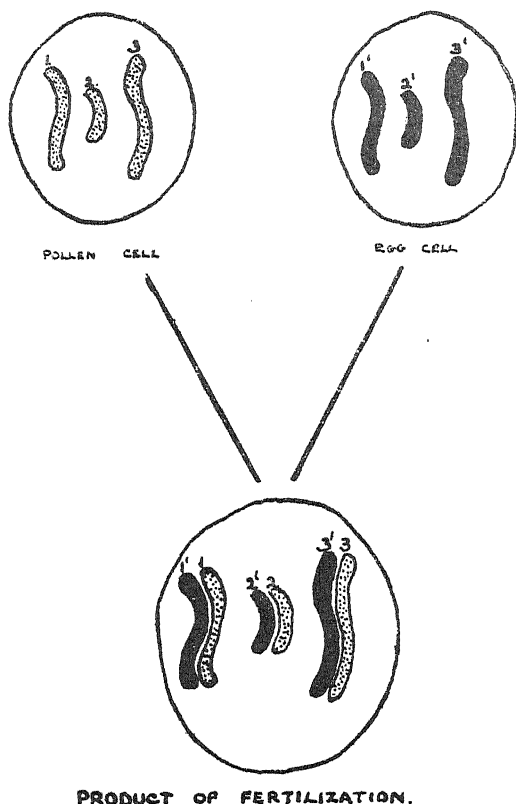


Fig. 3. Diagram showing pairing of homologous chromosomes (1 and 1', 2 and 2', etc.) on fertilization.

impossible. This is precisely what occurs in the cross between hard wheat and soft wheat. Hard wheat (*Triticum durum*) has 14 chromosomes in the reproductive cells, and soft wheat (*Triticum vulgare*) has 21. It is perfectly possible to get a hybrid individual from the cross between these two, but the individual has an unbalanced chromosome number, 14 from one parent and 21 from the other, making a total of 35, as opposed to 28 for the *durum* parent and 42 for the *vulgare* parent. The regular pairing of homologous chromosomes is therefore impossible, since, even if the 14 *durum* pair with 14 of the *vulgare* chromosomes, there remain 7 *vulgare* chromosomes unpaired. For this reason, at the time of formation of the reproductive cells with the reduced number of chromosomes,

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the behaviour of these unpaired chromosomes is very irregular; some may go into one of the two cells and others into the other, some may divide and the respective halves go into different cells, and some may even get left behind altogether and be lost. This results in the possession of very variable and irregular chromosome numbers by the daughter cells so produced, some of which have numbers closely approximating to that of the *vulgare* parent, others to that of the *durum* parent, and the majority intermediate between these two. The result in practice is that those with the intermediate numbers tend to show a considerable degree of sterility and gradually are lost from the cultures, only the ones with a close approximation to either 14 or to 21 remaining. What is more, the type of plant produced is seen to correspond to the chromosome number, in that those plants with round about 28 chromosomes are very much of the *durum* type and those with round about 42 closely resemble *vulgare*, and the plants of intermediate chromosome number are largely intermediate in type. If, therefore, our object in making the cross was to produce plants combining characteristics from both parental species, we have defeated our own ends, the only plants which do this being of intermediate chromosome number, with a high degree of sterility and useless for cultivation. This is, in fact, what has almost invariably happened in interspecific crosses between parents of different chromosome number. By using extremely large populations, it has occasionally been possible to find odd individuals combining one isolated character of the *durum* parent with an otherwise *vulgare* type of plant and full fertility. In crosses of a similar nature between different species of other plants, such combinations, however, have repeatedly proved impossible.

In recent years, geneticists have begun to realize more and more that this is not the only way of effecting hybrids between species differing in chromosome number. In 1926 Tschermak and Bleier (1926) described a hybrid between much more distantly related plants than the two wheats referred to above, which was, nevertheless, almost fully fertile and, more surprising still, was intermediate between the two parents; in fact, almost identical with the first generation hybrid. The precise mode of origin of these hybrids is not known, but the fact that they breed true, are fully fertile, and are intermediate, makes it almost certain

that they are of the type described some years previously for *Primula kewensis* (Digby, 1912, Newton and Pellew, 1928-29) and since observed in constantly increasing numbers in the products of wide crosses. The type to which reference is made is the so-called amphidiploid,* that is a hybrid between two plants whose chromosomes are so unlike as to be unable to pair, or with unequal chromosome numbers, and in which the chromosome number of the hybrid is not equal to the sum of the chromosomes of the reproductive cells of the parents, but to twice that number. In the wheat cross above, therefore, the chromosome number of the hybrid, instead of being 35, as in the case we examined, would, in an amphidiploid be twice that, namely 70, the plant thus ranking as a polyploid, that is, a plant with double or some other multiple of the basal chromosome number. Now the results of this doubling of the chromosome number are extremely important. It will be obvious to the reader that the question of chromosome pairing assumes a completely different aspect; instead of the 14 *durum* chromosomes pairing with 14 of the *vulgare* chromosomes and leaving 7 unpaired, it would now be possible for each chromosome to pair in the ordinary way. This is what in fact does happen in amphidiploids. There are other results; the chromosomes which pair are not only homologous, as in an ordinary wheat cross, but are identical—each chromosome entering into the cross pairs with another which is like it in every respect, the two having arisen from the division of the same original chromosome. The case therefore exactly corresponds to that of the self-fertilization of a pure line above mentioned; the offspring will all be identical and like the plant in which the chromosome-doubling took place. If this took place in the first generation hybrid, the offspring will all be like the F' (first generation hybrid). This is what, actually, is most often observed. The race of plants produced in this way is usually unlike any known plants and, in point of fact, corresponds to a new species. Many amphidiploids have already been classed as new species and received specific names very often before their mode of origin was known.

Such amphidiploids have not yet been found in crosses between wheat species, but they have been observed in crosses between wheat and other genera—wheat and *Aegilops*, and wheat and rye. The wheat-rye hybrids have

* Also termed autotetraploid or autopolyploid by other genetic writers.

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received a considerable amount of publicity and, as the original literature in which they are described is mostly in Russian, it may be profitable to give a brief outline of their discovery as it is described in the originals (Tiumiakov 1927, 1930, Meister 1930). In 1918, natural hybrids between wheat and rye were observed in the fields at Saratov in considerable numbers, in the progeny of certain lines in particular. These favourable lines were therefore sown out in special beds intermixed with rye and, in later years, a special method was devised of separating the hybrid grains from the ordinary selfed-wheat grains, namely by sifting the grains and sowing only the smallest; these proved to be the hybrids. The winter of 1924 was unusually severe and most of the wheat lines perished; the hybrids, however, were more resistant and survived. In the following year, certain plants displaying an exceptionally high fertility were observed, these plants being characterized by large percentages of fertile pollen, normal flowering and normal grain formation. These plants were retained and carried on to the third and fourth generation; they retained their almost complete identity with the F'.

That these plants represent a case of amphidiploidy is brought out by the cytological examination which was made of them by Levitsky and Benetzkaia (1930). The reduced chromosome number in rye is 7, and in the *vulgare* wheat used as parent, 21. The fertile hybrids were found, however, to have 56 chromosomes, which represents the sum of the chromosomes of the parents (28) multiplied by two.

These hybrids have displayed great resistance to cold and drought, together with many other valuable agricultural characteristics, and may be of much use in the future of Russian agriculture. Their significance from our present point of view is still greater, however, and can only be realized when it is taken into account that attempts had been made for many years in various countries to produce hybrids of wheat and rye of some agricultural value, and had invariably failed. Why then, it may be asked, have the workers at Saratov, without apparent effort, succeeded in getting not only a successful hybrid but one that bids fair to give the desired intermediate type without further breeding?

The answer to this question may possibly be sought for in the cold weather. It is definitely stated, in the first article

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on these hybrids (Tiumiakov, 1927), before it was realized that the hybrids were amphidiploids, that they were first observed in the harvest following the cold winter of 1924, and it seems almost impossible not to conclude that the low temperature was in some way instrumental in causing the polyploidy. Let us see if there is any foundation for this conclusion.

Amongst other facts, Koshuchow (1928) has shown that, by subjecting young seedlings to temperatures above and below the normal maximum-minimum temperature for their germination, tetraploid cells may be produced. That similar effects may be observed in nature has been made very clear in a recent article by Hagerup (1932). Observations were made in some of the most unfavourable growth situations of the whole world, both hot and cold. The plants associated with these regions were extremely interesting. In the less rigorous portions of the area, frequently near the banks of a river, the normal species of several plants were found, whilst further inland, where conditions were more extreme, different but closely-allied species occurred. On examination it was noticed that the species associated with the more extreme stations were polyploid, and in some districts a series of species was observed, on passing from normal to the most extreme conditions, in which the chromosome number rose from the ordinary number to tetraploid (twice the normal) and finally octoploid (four times the normal). It seems that not only do extreme conditions of temperature tend to induce the plant to double its chromosome number, but the polyploid forms when produced appear to be more able to withstand the rigorous conditions. There is a striking similarity in these two cases; the sudden appearance of a polyploid wheat-rye hybrid in the fields at Saratov immediately after an exceptionally cold winter, and the appearance of a gradually increasing polyploid series of the same species on passing from more or less equable to very extreme climatic conditions.

The question now arises as to whether this phenomenon could not be put to practical use by the plant breeder. The dream of many a breeder is to produce a new type of some crop plant that shall combine the valuable economic characters of the common cultivated form with some other quality that may appear only in a related species or genus: apart from the quality in question (very often disease-

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resistance) extreme earliness or some property of a similar nature, the related species may be useless from an agricultural point of view. Often the difficulty is not that the hybrid cannot be made (as in the cross of *Triticum durum* and *T. vulgare* above), but that, when obtained, it is sterile or partially so. The objection to the fertile wheat-rye hybrids, such as those obtained by Meister and Tiunyakov at Saratov, is that only one type has appeared, namely the product of the particular hybrids whose chromosome number happened to be doubled in the severe winter of 1924.

Could the plant breeder, however, be provided with a certain means of producing polyploid offspring at will from any desired hybrid, the matter would assume a very different aspect. It should then be possible to choose with great care two varieties of the parental species whose first generation hybrid most nearly approaches the desired type, cross them, subject the sterile or partially-sterile hybrid to high or low temperature at the time of flowering, and await the result in the following generation. The result, if everything has gone according to plan, will be the appearance of a number of true-breeding, fully-fertile hybrids, identical with the first generation hybrid which it was agreed was the desired type. It will be seen that, in this way, not only should we obtain a hybrid which it is impossible to produce by the ordinary hybridization method, but we should attain a true-breeding type in very much quicker time. In the ordinary way, no hybrid is fit for extensive tests until it has reached the 12th or even later generations, whereas, in the method of induced polyploidy, a true-breeding type would be obtained in the second generation. This does not exhaust the possibilities of the method; if the new polyploid happens to be equal in chromosome number to an economic species already known, then it is possible that the two will give fertile hybrids, and so a whole new avenue of breeding possibilities is opened up; combinations of genes from the three species, hitherto not possible, will be a matter of simple hybridization.

I am well aware that a method, such as prophesied above, seems almost too Utopian even to be entertained at the present time. On the other hand, recent experiments on maize in America (Randolph, 1932) seem to have

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supplied the final stage of the process, the most vital stage of all, namely the artificial induction of polyploidy by treatment of the young ear. Ears were taken in which the fertilized egg cell, that is the first cell of a new generation, containing both the chromosome sets, one contributed by the male and the other by the female, was in a state of division. Such ears were immersed in hot water at a temperature of 40-45° C. and, amongst the progeny of these ears, various anomalous plants appeared, in some of which the doubling of the entire chromosome set had occurred, that is polyploid individuals. Now the significance of this result is in the fact that, although cases of such chromosome doubling in sterile or partially sterile hybrids with unbalanced chromosome condition are not uncommon, they are of extremely rare occurrence in ordinary self-fertilized plants or varietal hybrids such as the ones used in Randolph's experiments, and even attempts to induce them by means of X-rays and similar agencies have been unsuccessful. If, therefore, they can be induced by heat treatment in self-fertilized plants, what grounds have we for supposing that their production by similar means in unbalanced hybrids, in the way suggested in the former hypothetical case, would not be equally, if not more, successful?

August, 1932.

(NOTE.—Those who wish for further details on the subject of interspecific crossing are referred to the bibliography on the subject recently issued by the Imperial Bureau of Plant Genetics, price 2s. od. post free.)

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FALLOWING FOR WEED SUPPRESSION

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THE urgent necessity for weed suppression is recognized by all who till the soil, but in spite of untold centuries of constant warfare against weeds these unwanted plants are still one of the farmer's chief problems and offer a sturdy resistance to the many methods of eradication that have been devised. Much of the difficulty lies in the ease with which most weeds are propagated, either by seed or by vegetative means, and in the length of time the seeds or underground parts can retain their vitality while buried in the soil.

Mechanical and chemical methods of weed suppression both have their value, but the former are more generally used, as they fit in most naturally with the normal cultivation of the crop. Where perennial weeds are rife, the aim should be to allow them to grow up to some extent in order to exhaust the food reserves stored below ground, and then to cut them down before there is any danger of them coming into flower, and before fresh reserve supplies can be manufactured. Where annual weeds are the menace, prevention of seeding is the main object, the easiest time of attack being whilst the seedlings are quite small. A judicious rotation of crops, providing various types of cultivation at different seasons over a cycle of years, goes far towards keeping weeds in check, but when for some reason particular weeds have gained the upper hand, more drastic measures may be needed, even at the expense of a temporary loss of crop. The time-honoured method is to fallow the land for a period, keeping the soil repeatedly cultivated to encourage weed seeds to germinate and to

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destroy the resulting seedlings. Little definite information is available as to the ultimate benefit of such fallowing, but since 1925 the question has received special attention at Rothamsted.

Broadbalk field, which has carried autumn-sown wheat since 1843, offers peculiar difficulties to weed suppression, as the time for cleaning the land between harvest and sowing is so short. If a fresh species of weed is introduced in any way, it has every opportunity to establish itself and become a serious menace to the crop. A case in point is the common red poppy (*Papaver rhoeas* L.) of which a few isolated plants appeared about 1907, and which has since multiplied so greatly that it is now as serious a problem as the black bent (*Alopecurus agrestis* L.), which was previously the dominant weed. In 1925 fallowing operations were begun on Broadbalk with the definite object of reducing the weed flora. Part of the field was fallowed for two consecutive years and part for four years; the rest remained under crop. In 1927 the process was reversed, so that ultimately the whole of the field had been fallowed for at least two years. The effect of this fallowing on perennial and annual weeds needs separate consideration.

A. Influence of Fallowing on Perennial Weeds.—Coltsfoot (*Tussilago farfara* L.), horsetail (*Equisetum arvense* L.), field sowthistle (*Sonchus arvensis* L.) and creeping thistle (*Cirsium arvense* Scop.) have been the most troublesome perennial weeds on Broadbalk field, and up to 1925 they were abundant on certain plots, the quantity of each species varying with the manuring and with the season. During the period the fallowing operations were carried out these weeds were kept under, as the repeated movement of the soil did not give them time to develop their stems and leaves above ground. In the year immediately after the fallow, when the land was again cropped with wheat, it was obvious that the weeds had been reduced. A certain amount of coltsfoot appeared in the early spring on two plots where it had hitherto been exceedingly abundant, but it failed to spread and later in the year was of very little importance. The other three perennials were either absent or appeared in very small quantities. As time went on it became evident that fallowing for two years had caused a real reduction in all these perennial

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weeds, and, up to June, 1932, none of them had begun to spread again, all being present in such small quantities that frequently they are not recorded at all on certain plots where they used to be plentiful.

The success of this experiment suggests that where serious infestations of perennial weeds are concerned fallowing offers an effective means of reducing their numbers and weakens the remaining plants so severely that the land can easily be kept free from them for several years at least. Where bare fallow is uneconomic, root crops might serve the same end, especially if two could be taken in succession. The period between autumn harvest and the late sowing of root crops affords the opportunity for carrying out repeated movements of the soil, and the cultivation necessary for growing a successful root crop provides the practical equivalent to a bare fallow for the rest of the season.

B. Influence of Fallowing on Annual Weeds.—A census of the number of buried weed seeds in the soil was made yearly by taking many samples of known area and depth at regular intervals down the field. These samples were reduced in bulk by washing away part of the soil through sieves which were too fine to allow any weed seeds to escape. The remaining soil, with all the seeds included, was placed in earthenware pans in a greenhouse, and kept watered and cultivated for three years, all the weed seedlings that appeared being counted and removed as soon as they were large enough to identify. As the samples were all the same size, it was then possible to compare the behaviour of any particular weed from year to year on the parts of the field under crop and under fallow.

Preliminary samples, taken in 1925 before fallowing, give a vivid picture of the great numbers of living weed seeds that may be present in a cultivated soil, awaiting their opportunity to germinate and come into active competition with the crop (Table I). The numbers are considerably influenced by the manuring, especially where the same fertilizers are applied yearly, as is the case on Broadbalk.

For instance, while the number of poppy seeds ranged from 52 to 6,092 per square foot, according to the manurial treatment, black bent showed much less variation, dropping to a comparatively low level only on the plot receiving mineral manures and no nitrogen. Although the numbers

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TABLE I.—LIVING WEED SEEDS PRESENT PER SQUARE FOOT OF SOIL TO A DEPTH OF 6 IN.

Broadbalk Field. Sampled: October, 1925.					
<i>Manuring.</i>	<i>Poppies</i> (<i>Papaver</i> spp.).	<i>Black bent</i> (<i>Alopecurus</i> <i>agrestis</i>).	<i>Other Annual</i> <i>Weeds.</i>	<i>Total.</i>	
Dung	824	295	883	2,002	
Mineral Manures ..	52	97	625	774	
Ammonium sulphate					
+ complete minerals ..	3,219	333	1,158	4,710	
Ammonium sulphate ..	924	264	375	1,563	
Ammonium sulphate					
+ minerals without					
potash	6,092	404	318	6,814	
Sodium nitrate					
+ minerals	5,237	247	776	6,260	
Ammonium sulphate					
and minerals in					
alternate years ..	1,802	407	1,098	3,307	

of any weed may be thus affected by manuring there are very few species that are associated with any one fertilizer only.

Dormant Seeds.—Comparison of the numbers of seeds that germinated in successive quarters over a period of three years showed that very few species germinate freely throughout the year. With most species the majority of seedlings appear during the autumn or winter, or both, relatively few coming up in late spring or summer. Most of the seeds that fail to germinate at the time proper for the species remain lying dormant in the soil until the next year or even longer, eventually starting into growth at their normal season. With most weeds a certain number of seeds persist in lying dormant for a year or more, even if conditions are favourable for germination. It is this residue of dormant seeds that makes it so difficult to suppress certain weeds, even by most careful cultivation, as the seeds may unexpectedly start into growth after irregular intervals that cannot be controlled or estimated.

An excellent instance of prolonged dormancy was shown by one of the samples taken during the experiment. In 1927, several seedlings of knotgrass (*Polygonum aviculare* L.) came up in one sample, and though the soil was thoroughly worked over several times a year no more seedlings appeared until the year 1932. There was no possible way in which fresh seeds could have been carried in, and the seeds had simply been lying dormant in the soil for at least five years.

A few weeds, of which black bent is a notable example,

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germinate very quickly after they are shed, and such species are more easily dealt with by cultural methods. This difference in the habits of germination and dormancy largely explains why fallowing or intensive cultivation may be so much more successful in some cases than others. When a large proportion of buried seeds lies dormant over the fallowing period a plentiful stock of seed is ready to start recolonization immediately the land returns into crop, without waiting another year for restocking by fresh seed produced by renewed growth of weeds.

The information gained by comparing the annual samples taken from the fallowed and cropped portion of Broadbalk is most conveniently considered under three headings:—

- (1) Frequency and time of cultivation necessary for successful fallowing.
- (2) Reduction of different weed species by fallowing as compared with cropping.
- (3) Rate of return of weeds when land is again cropped.

(1) Frequency and Time of Cultivation Necessary for Successful Fallowing.—The success of fallowing for weed suppression depends upon the production of a fine seed-bed to encourage germination, and on repeated cultivation at intervals close enough to prevent any further seed formation. Autumn cultivation catches a large proportion of the annual weeds, but is ineffective for those that germinate in early spring, of which knotgrass (*Polygonum aviculare*) and lamb's quarters (*Atriplex patula*) are instances of the more important. Where such weeds are troublesome spring cultivation needs special attention,* for the earlier autumn ploughing and harrowing are of no avail in reducing these particular weed seeds.

For winter fallowing it is sometimes considered sufficient to plough up the land in the autumn, cultivate it occasionally until about October or November, and then leave it until February. After that the land is ploughed, harrowed or cultivated in other ways as frequently as opportunity offers. This treatment is effective for most weeds, but not for all. A few species, shepherd's purse (*Capsella bursa-pastoris* D.C.), thyme-leaved sandwort (*Arenaria serpyllifolia* L.) and field speedwell (*Veronica buxbaumii* Ten.)

* An account of the behaviour of many of the commoner weed species will be found in the *Journal of Ecology*, Vol. XVIII, No. 2, pp. 235-72 (1930). Brenchley, W. E. and Warington, K. The Weed Seed Population of Arable Soil. I. Numerical Estimate of Viable Seeds and Observations on Their Natural Dormancy. *Ibid.*, Vol. XXI, pp. 103-127 (1933). II. Influence of Crop, Soil and Methods of Cultivation upon the Relative Abundance of Viable Seeds.

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failed to show any reduction after fallowing, and in some instances their number was even increased. These are all weeds that will germinate freely late in the year, and can be found in flower under ordinary conditions during the winter. Possibly, therefore, during the winter period, when the land is not cultivated, sufficient new seeds can be produced by these plants to replace those whose seedlings are cut down by later cultivation. It is quite possible, too, that some restocking of the soil by seeds of these plants occurs in the intervals between cultivations in the spring, as they all begin to flower and seed at a very early stage of growth, and continue to do this freely throughout their lifetime. This demonstrates the great importance of keeping the land frequently moved when fallowing is being carried out. When conditions permit, an extra cultivation during the winter months might be a great aid to the effectiveness of a fallow, as the mild weather which would allow of cultivation provides just the seasonal conditions that would encourage the winter-growing weeds to flower and seed more freely than usual, and the extra cultivation would destroy them. During the spring and summer, a single failure to cultivate at the proper time may provide opportunity for a whole host of small weeds to set seed, and a very few seeds per plant would be quite sufficient to undo all the value of the fallowing by restocking the soil with fresh, viable seed.

(2) Reduction of Different Weed Species by Fallowing as Compared with Cropping.—Under ordinary farm conditions it is well recognized that the prevalence of different weeds varies from year to year. There may be a great reduction in a common weed, greater than can be accounted for by the methods of cultivation adopted, or a comparatively inconspicuous species may appear in such abundance as to cause serious trouble among the crops. This seasonal fluctuation is difficult to account for, but is an important factor that cannot be disregarded. The sudden decrease of any weed may be due to a variety of causes. The seeds produced by the previous weed crop may have failed to ripen properly owing to unfavourable weather; soil conditions during the winter months may cause many seeds to rot in the ground; the weeds may germinate when the crop is growing very actively, so that the seedlings meet with undue competition and many are

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crowded out of existence; or they may germinate just in time to be cut down by the cultivation of the crop, such as by harrowing or hoeing. In estimating the value of fallowing it is therefore necessary to make comparison with the prevalence of seeds of the same weeds on cropped areas.

Broadly speaking, weeds can be divided into two main groups, in one of which fallowing is a very definite and consistent agent in their reduction, while in the other the comparative effects of fallow and crop cultivation vary according to the season.

(a) *Weed Seeds Consistently Reduced under Fallow, but not with Crop (Table II A).*—Several most troublesome weeds, as poppy, black bent and black medick come into this group. During the Broadbalk experiment their buried seeds were heavily reduced every year during the period of fallowing, whereas under crop they increased or decreased from year to year without any regularity, showing marked seasonal variation. Consequently, while fallowing depleted the soil of weed seeds, the fluctuations under crop left the land heavily infested, suggesting that for weeds of this class periods of bare fallowing or cropping with roots afford means of effecting a definite reduction when their numbers become serious. For purposes of reference the actual figures for some of the commonest weeds are set out in Table II A, the first three columns showing the steady decrease from year to year under fallow, and the second three columns the seasonal variations under crop over the same period.

The degree of reduction varies very much, black bent responding more readily to fallowing operations than any other weed, the reduction being from 259 to 11 per sq. ft. in two years. This is largely because black bent seeds germinate very readily if they are brought into favourable conditions, very few of them lying dormant in the soil. Consequently, the repeated cultivations encourage the majority of the seeds to germinate and the seedlings are readily cut down long before they have an opportunity to flower. With poppies, on the other hand, such a large proportion of the seeds normally remain dormant for several years that many of the original stock are still present in the soil at the end of the fallowing period, 872 per sq. ft. remaining out of the initial 1,877 per sq. ft. Under crop, however, the final stock in the soil was more than three times as great. Cleavers, black medick, forget-me-not and field speedwell behaved in a similar way, but their numbers were much smaller and the results were consequently less spectacular.

(b) *Weed Seeds for which the Comparative Effects of Fallowing and Cropping vary with Season (Table II B).*—With several weeds the number of buried seeds was reduced both by fallow and by crop, though the reduction was frequently less in the latter case. In these instances it is more difficult to estimate the economic value of the fallow, as much of the reduction may have been influenced by seasonal conditions, and may not have been a direct result of the intensive cultivation. The seasonal conditions during the experiment caused a natural decrease in the number of buried seeds, this reduction being accentuated by fallowing operations. In some instances, where fallowing seemed of little value in reducing these weeds, the increase on the cropped areas showed the repressive effect of the fallow. Shepherd's purse (*Capsella bursa-pastoris*), though not reduced by fallow, rose from 10 to 22 per sq. foot on the cropped areas. This is one of the insidious weeds that flower and fruit very early in life, and the apparent lack of reduction under fallow may have been due to plants

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that were able to set seeds in the intervals between cultivations. Chickweed and groundsel may both become troublesome pests under certain conditions, and the great freedom with which they seed necessitates special watchfulness if they happen to be the special pests against which operations are being directed.

TABLE II.—NUMBERS OF BURIED WEED SEEDS PER SQUARE FOOT OF BROADBALK SOIL DURING FALLOW: DEPTH 6 IN.

	Fallowed area.			Under crop throughout		
	Before fallowing, 1925.	After 1 year in fallow, 1926.	After 2 years in fallow, 1927.	1925.	1926.	1927.
<i>A. Reduced consistently under fallow, but not with crop.</i>						
Black Bent (<i>Alopecurus agrestis</i>) ..	259	56	11	342	452	469
Cleavers (<i>Galium</i> spp.) ..	17	3	1	9	8	17
Black Medick (<i>Medicago lupulina</i>) ..	8	2	1	9	18	7
Forget-me-not (<i>Myosotis arvensis</i>) ..	49	16	8	10	21	25
Field Poppy (<i>Papaver</i> spp.) ..	1,897	1,227	872	3,299	2,873	2,791
Field Speedwell (<i>Veronica arvensis</i>) ..	155	76	35	66	136	86
<i>B. Comparative effects of fallowing and cropping varying with season.</i>						
Lady's Mantle (<i>Alchemilla arvensis</i>) ..	263	109	84	259	203	193
Red Bartsia (<i>Bartsia odontites</i>) ..	8	2	2	9	3	2
Corn Campanula (<i>Legousia hybrida</i>) ..	27	12	8	37	13	12
Knotgrass (<i>Polygonum aviculare</i>) ..	62	13	2	40	13	3
Shepherd's Needle (<i>Scandix pecten</i>) ..	27	6	1	25	3	1
Groundsel (<i>Senecio vulgaris</i>) ..	16	4	1	19	14	7
Chickweed (<i>Stellaria media</i>) ..	4	1	1	7	4	2
Ivy-leaved Speedwell (<i>Veronica hederæfolia</i>) ..	46	34	19	40	28	21

(3) **Rate of Return of Weeds when Land is again Cropped.**—The immediate effect of the Broadbalk fallowing was to stimulate the succeeding wheat crop, which gave an exceptionally heavy yield. The same encouragement appeared to have been offered to certain of the weeds, which grew with great freedom and rapidly stocked the soil with even more seeds than were present before the fallow (Table III). Many of the weeds did not behave in this way; once reduced by fallowing, they have not again increased, poppy being amongst these. This is noteworthy, since, though poppies are not drastically reduced by inten-

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sive cultivation, any reduction that can be effected may possibly be maintained by ordinary cultivation. This result, coupled with the history of poppies on Broadbalk, suggests that handpulling of the first few poppies that may appear in any fresh place may save great trouble and expense in the future. The contrast between the behaviour of poppy and black bent is shown in Fig. 1. Unfortunately the rapidity with which some of the worst weeds reasserted themselves was alarmingly great (see Table III).

TABLE III.—RETURN OF BURIED WEED SEEDS AFTER FALLOWING.

<i>Average Number of Seeds per Square Foot, Broadbalk: Depth 6 in.</i>					
		After 2 years fallow. 1927.	After 1 year in crop. 1928.	After 2 years in crop. 1929.	After 3 years in crop. 1930.
Lady's Mantle (<i>Alchemilla arvensis</i>)	..	84	230	275	418
Black Bent (<i>Alopecurus agrestis</i>)	..	11	110	544	828
Thyme-leaved Sandwort (<i>Arenaria serpyllifolia</i>)	..	31	103	105	116
Red Bartsia (<i>Bartsia odontites</i>)	..	2	11	18	28
Black Medick (<i>Medicago lupulina</i>)	..	1	2	9	28
Forget-me-not (<i>Myosotis arvensis</i>)	..	8	17	34	32
Chickweed (<i>Stellaria media</i>)	..	1	12	62	42
Field Speedwell (<i>Veronica arvensis</i>)	..	35	169	445	535
Ivy-leaved Speedwell (<i>Veronica hederæfolia</i>)	..	19	25	61	56
Field Poppy (<i>Papaver</i> spp.)	..	872	801	868	1,121

The heavy increase in the first year under crop was evidently the mischievous factor and points to the need of diligent cultivation during this period in order to prevent as many weeds as possible from seeding. If the number of weeds could be kept down for a year or two after fallowing till the soil conditions became normal, the growth might perhaps be less rampant and the rate of seeding less prolific.

Conclusions.—The general results of this fallowing experiment may be summed up briefly as follows:—

- (1) Bare fallowing, which allows repeated cultivation of the soil, is an effective method of reducing the numbers of buried weed seeds, *provided* the cultivations are frequent enough to prevent any weeds from growing up and seeding.

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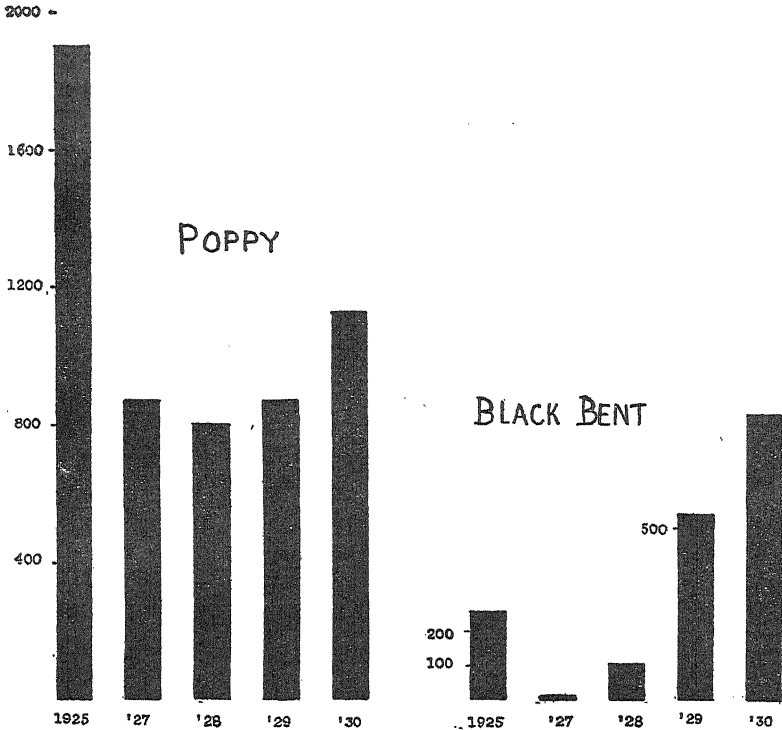


FIG. 1.—Number of weed seeds of poppy and black bent per square foot, illustrating the after-effects of fallowing when Broadbalk wheat field returned into crop.

1925. Seeds present before fallowing.

1927. " " after two years' fallow.

1928, '29, '30. Seeds present after 1, 2 and 3 years respectively in crop.

- (2) The interval between autumn and spring cultivation is frequently too long, as certain common weeds can flower and seed in a mild winter season, rendering the fallow useless in regard to them. This may be met by later autumn cultivations and sometimes by winter cultivation in mild weather.
- (3) Many of the worst weeds will rapidly recolonize the soil unless special attention is given to weed reduction during the first few crops after fallow.
- (4) Short periods of fallowing may be very useful in certain cases provided they fit in with the times of maximum germination of the special weeds that it is desired to reduce. For instance, autumn cultivation is of little use against knotgrass (which germinates chiefly in the spring), whereas black bent is most readily attacked at this season.
- (5) Perennial weeds can effectively be reduced by fallowing, particularly if this can be carried on long enough to exhaust the underground reserves.

PIG RECORDING AS A FACTOR IN CHEAPENING AND INCREASING PIG PRODUCTION

H. R. DAVIDSON, M.A.

Reasons for Increased Pig Production.—In considering the whole question of increasing and cheapening stock production, it is legitimate to ask if there are sound reasons for believing that an increase in the number of pigs produced in this country is either possible or desirable.

Regarding the possible scope for expansion: if one takes the figures for 1926-1930 (five typical years before the recent abnormal increase in total imports took place), our total imports of bacon were $8\frac{1}{2}$ million cwt. per annum, while the home sow population was between 300,000 and 400,000. As one bacon pig produces approximately 1 cwt. of cured bacon, and as, at present, each sow is only producing about 10 bacon pigs per sow year, it will be seen that, to replace the $8\frac{1}{2}$ million cwt. of imported bacon, there would be required an increase in the home sow population of rather over 800,000. The labour required, directly and indirectly, to deal with this increase has been estimated by the Pig Industry Council at 80,000 men per annum. The extra turnover to farmers would be £32,000,000, on which a profit of 5 per cent. per annum would represent £1,600,000. There are, therefore, good reasons for increasing pig production in this country if such increase can be shown to be economically profitable.

Danish Over-production.—When one comes to examine the factors that affect the economics of increasing British pig production, the situation is found to be complicated by the recent disastrous fall in bacon prices, very largely owing to over-production by Danish producers during the last two years. The normal interaction of supply and demand that maintains a normal relationship between costs of production and selling price has not been operating, as is clear from the relative prices and amounts of imports in the last two or three years.

In 1929, imports of foreign bacon amounted to $8\frac{1}{4}$ million cwt. (of which 5 million were from Denmark), while the average price paid to Danish producers for baconers was 16s. 1d. per score.

In 1931, the total imports of bacon had risen to over 11 million cwt. (of which Denmark supplied 7,300,000), yet

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the price paid for first quality bacon carcasses in that country had dropped to 6s. 8d.

Official figures published in Denmark show that, in 1929, when food was costing $\frac{7}{8}$ d. per lb., the cost of producing a score of bacon carcass was 13s. 8d. Since the selling price at that time was 16s. 1d. per score, there was ample margin for profit. In 1931, however, the selling price had dropped to 6s. 8d. per score, which must be considerably below the actual cost of production. Even if Danish farmers can now* obtain feeding stuffs at as low an average figure as $\frac{5}{8}$ d. per lb., it must cost them, on the basis of their own published costs, 11s. per score to produce baconers, so that, at 6s. 8d. per score from the factory, they are losing 4s. 4d. per score, or over 30s. per pig.

One may, perhaps, be permitted to recall at this point the advice which Mr. Micawber gave to young David Copperfield on the question of economic difficulties. "Annual income twenty pounds, annual expenditure nineteen nineteen six, result happiness. Annual income twenty pounds, annual expenditure twenty pounds ought and six, result misery. The blossom is blighted, the leaf is withered, the god of day goes down upon the dreary scene, and—and in short you are for ever floored. As I am."

Obviously, if foreign competitors continue to increase their exports and sell them here at a figure so very far below the cost of production, there can be no question of advising an increase in home production.

Financial Investigations into the Returns from British Pig-Keeping. — Returning, however, to the possibilities of increasing production by making it more economically profitable, it is necessary to examine first of all what has been the financial situation in the *past*, i.e., *before* the operation of uneconomic foreign competition.

Of the investigations that have been made into the financial results of pig-production, two of the widest are those reported by Carslaw for the East Anglian Province, and Wyllie for the South-Eastern Counties.

Over a period of five years, Carslaw found that pig-production gave a return of 5 per cent. on capital, but as no allowance was made for many factors, including unpaid family labour, interest on capital, management expenses, and profits on home-grown cereals, this branch of farming

* September, 1932.

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must have been carried on at a net financial loss.

The figures given by Wyllie show a net loss of over 20 per cent. for the farms costed in his area, so that in these two typical pig-producing areas, during the last five years or so there has, on the average, been a decided loss on the keeping of pigs.

On the other hand, investigations carried out at the Rowett Research Institute before the abnormal fall in prices, showed that it was actually possible to make pig-keeping pay. The average cost of producing baconers when the price of food was 1*d.* per lb. was 14*s.* 1*d.* per score.

In the herd kept at the Institute, however, the results achieved were better than one could reasonably expect on the average farm, a live weight of 210 lb. being reached in 205 days for all pigs of that weight in the herd.

It is necessary, therefore, to adjust the cost figure to a level of production that can reasonably be expected where good management is employed and, for this reason, the results are expressed in a formula where 210 lb. is assumed to be reached at 220 days.

When the fluctuating and non-fluctuating items are worked out, the costs of production of a standard pig for varying prices of feeding stuffs is given by the following formula:

Cost per score = 4*s.* 9*d.* + cost of 132 lb. dry food equivalent.

From this the following table has been compiled:—

Cost of food per lb.				Cost of carcass per score.	
<i>d.</i>				<i>s.</i>	<i>d.</i>
$\frac{1}{4}$	..	..	..	7	6
$\frac{3}{8}$	..	..	..	8	10 $\frac{1}{2}$
$\frac{1}{2}$	..	..	..	10	3
$\frac{5}{8}$	..	..	..	11	7 $\frac{1}{2}$
$\frac{3}{4}$	..	..	..	13	0
$\frac{7}{8}$	..	..	..	14	4 $\frac{1}{2}$
1	..	..	..	15	9

In the same way, the cost per weaner is given by:—

Cost of weaner = 10*s.* + cost of 220 lb. dry food equivalent.

The cost *per pig* at varying food costs will therefore be:—

Cost of food per lb.				Cost per weaner.	
<i>d.</i>				<i>s.</i>	<i>d.</i>
$\frac{1}{4}$	14	7
$\frac{3}{8}$	16	10 $\frac{1}{2}$
$\frac{1}{2}$	19	2
$\frac{5}{8}$	21	5 $\frac{1}{2}$
$\frac{3}{4}$	23	9
$\frac{7}{8}$	26	0 $\frac{1}{2}$
1	28	4

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It will be remembered that the Danish figure for cost, with food at $\frac{7}{8}d.$, was 13s. 8d., and this approximates very closely to the above figure at 14s. $4\frac{1}{2}d.$

During the five years 1926-30, the average cost of feeding stuffs in this country was 1d. per lb., and the average price for baconers was 16s. 9d. per score, so that it was possible to produce pigs to give a profit of 1s. per score. If, then, it has been possible to make a profit of 1s. per score during a period when British costs have coincided as closely as they have with foreign figures, it is unlikely that political action would lead to protective adjustments allowing of prices substantially in excess of those in the above table. In other words, if, owing to tariffs, feeding stuffs remain around the present figure of $\frac{3}{4}$ d. per lb., the cost of production will approximate to 13s. per score, so that, with the exception of a reasonable margin for profit, this would be the figure within which it would be necessary to develop an increased British pig production.*

Financial Implications of British Records.—We have next to consider why, if it has been possible to make a profit, there should be reported such definite losses as have just been referred to, and it is here that pig recording proves of such value. The formula for cost of production, already mentioned, is based on a growth-curve in which the bacon pig reaches 210 lb. at 220 days, and on a weaning average of 15 pigs per sow year. Results from the first year's working of the East Anglian Pig Recording Scheme have shown the average age of 210-lb. pigs to be 250 days, and the weaning average to be only 10.6 per sow year. The few available figures show that the averages for the rest of the country are no better than these. The cash value of these differences may be calculated as follows:—

Difference of 250 days over 220 = 30 days, which at 6 lb. of food per head per day (at $\frac{3}{4}d.$ per lb.), amounts to $135d. = 11s. 3d.$ per pig.
Cost of weaner (food at $\frac{3}{4}d.$ per lb.) s. d.

Cost of weaner (sold at 4 $\frac{1}{2}$ lbs. F.	when 15 weaned per sow year	= 23 9
Do. do. when 10.6 do.		= 32 8
	Difference ..	8 11
Reducing these to figures per score.		<i>s. d.</i>
Age-for-weight 135 <i>d.</i> extra on 7 sc. 15 lb.		1 5 $\frac{1}{2}$
Fecundity 107 <i>d.</i> " " "		1 2
	Total ..	2 7 $\frac{1}{2}$

* Since this paper was written the Pig Reorganization Commission have suggested a price formula from which the cost per score of a bacon pig is found to be 10s. 8d. when food costs $\frac{1}{2}$ d. per lb.

If there is only 1s. per score for possible profit, as has already been shown, then this is cancelled and there is left a net loss of 1s. $7\frac{1}{2}d.$, or approximately 9 per cent. on cost of production, which is roughly in line with the scale of loss shown by the financial investigations.

Factors affecting the Cheapening of Pig Production.—Much has been heard recently of the possibility of reducing costs of production by the adoption of tank curing, and of increasing selling prices by improving carcass quality. When these possibilities are examined financially they are not found to lead to an improvement of more than 1d. per score at the most. Age-for-weight and fecundity per sow year, therefore, are apparently the two major factors in reducing costs of production, and the problem is to determine how best to improve their efficiency under the conditions of practical farming that exist in this country to-day.

On this matter, two clearly defined schools of thought exist—one claiming that improvement is mainly to be obtained along the lines of genetics alone; the other that, while inheritance plays an obviously important part in still further improving the best pure-bred stock, the immediate problem is rather to eliminate the badly-bred stock, and at the same time so to improve the environmental factors of feeding and management that the existing stock is given the opportunity of yielding its full potential results. From references in the press and elsewhere, it would seem not only that the former is the more widely held opinion, but that improvement by genetic selection is believed to be best carried out by means of what is popularly known as litter testing.

Examination of what has been achieved in this respect in Denmark, where more and older records are obtainable than in any other country, suggests that such expectations are hardly justified. During the last twenty years the age-for-weight has only improved by approximately 1 day per year. The weighted average of all pigs tested from 1910 to 1917 was 199 days, while for the period 1929-31, which is the last for which records are available, it had only been reduced to 182 days. The average improvement in any given period of five years has not been more than nine days. Assuming that on this analogy, litter testing would, during the next five years lead to an improvement of nine days, and that, as previously calculated, 6 lb. of meal be taken as an average daily consumption of a pig at bacon weight,

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then 54 lb. of meal will have been saved, which, at $\frac{3}{4}d.$ per lb., represents 40.5*d.* per pig, or 5 $\frac{1}{4}d.$ per score.

Then again, in the case of numbers weaned per litter, it might be possible, *by genetic selection alone*, to improve the average figure for the country from 6.0, which is the present approximate figure, to 7.5, which has been shown capable of attainment. Taking the previous figure of 23*s.* 9*d.* as the cost per weaner when 15 pigs are weaned per year in two litters, then the cost, if only 12 are reared, will be 29*s.* 9*d.*, showing a difference of 6*s.* per pig, or 9 $\frac{1}{4}d.$ per score dead weight.

These two possible improvements together amount to a saving of only 1*s.* 2 $\frac{1}{2}d.$ per score, as against the net loss of 1*s.* 7 $\frac{1}{2}d.$ already referred to, so that, by themselves, they are inadequate to put production on a paying basis, though requiring about five years for their full attainment.

In comparison with these figures, one has to consider what improvement can be achieved by pig recording. In the three years in which it has been in operation, the East Anglian Scheme has shown a very marked improvement in age-for-weight. In 1928, the average per pig was 34 days over standard. In 1929, it was only 17 days, and in 1930 it was actually four days under standard. The actual saving in food alone (again assuming $\frac{3}{4}d.$ per lb.) represented by this saving, is equal to over 1*s.* 10*d.* per score, or considerably more than the 1*s.* 2 $\frac{1}{2}d.$ per score estimated to be saved after five years' improvement by litter testing. In individual cases the improvement reported is even more notable.

The Relative Merits of Litter Testing and Pig Recording.—Having attempted to prove that, under present conditions, the first object must be to bring up the general level of management of our existing stock to the average that has been shown capable of achievement, one hastens to corroborate the subsequent value of genetic selection, not so much as a means of improving our best strains, but rather of eliminating those that can be clearly shown to be unprofitable.

In this connexion, however, it is necessary to make it clear that pig recording as now worked out in this country, is, in addition to supplying data on management otherwise unobtainable, capable of carrying out genetic selection in many ways as efficiently, and in some ways much more efficiently than litter testing, and in any event at less than 5 per cent. of the cost.

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In spite of what has been written and said about recording, it is still believed to consist almost entirely in counting and weighing the litter of a sow at some period not later than weaning. The great majority of people interested in the subject still fail to appreciate that, as now developed in this country, recording has been ahead of all other methods so far evolved in combining the recording of prolificacy, age-for-weight, and carcass quality.

In view, therefore, of the reorganization of producers' methods, which is demanded by economic facts, and is now actually taking place under the marketing scheme, the advantages that are claimed for pig recording over litter testing may be briefly outlined as follows:—

1. It supplies information on fecundity and maternal properties of sows, which would otherwise be lacking. In Denmark, where litter testing has been carried out for a longer period and more successfully than anywhere else, the question of fecundity is controlled, apart from the testing stations, by a far-reaching method of family herd books and national herd books which have no counterpart in this country.

2. In addition to fecundity, it provides for records of age-for-weight and carcass quality on at least as detailed a scale as does litter testing.

3. It deals with all the members of a litter, and with all the litters of a sow. Owing to considerations of expense and accommodation, it has only been found possible in litter testing to deal with four pigs from a litter and to test one litter from each sow. It is surely stretching scientific theory rather far to suggest that four pigs from one litter give a really accurate indication of the genetic constitution of the sow.

4. Consideration by the most important pig-producing countries in the world, of past experience and future possibilities, has led such countries as Sweden, Germany, Poland, America, New Zealand and Canada to develop schemes based on the recording method. In both Canada and New Zealand, pig-recording methods have been based very closely on the East Anglian Scheme, and the New Zealand method is now so complete that pigs recorded for fecundity and age-for-weight in that country are in many cases recorded for carcass quality in the premises of London salesmen in Smithfield Market.

PIG RECORDING

5. A final, and perhaps the most telling, argument in favour of pig recording is the question of cost. With a population of 400,000 breeding sows, as at present, ten testing stations would only deal with 600 per annum or 0.15 per cent. It has been officially estimated that a testing station with a capacity of 60 litters per year, would cost £1,000 for capital cost of erection, and £350 per year for running expenses. To deal with only 1 per cent. of the sows in the country, over 66 testing stations would be required, at an initial capital cost of £66,000 (in practice probably much nearer £100,000) and an annual expenditure of £23,100. The annual cost alone would enable 61,600 litters to be recorded annually under the recording method at 7s. 6d. per litter, or approximately 15 per cent. of the breeding sows in the country. (Last year only 6.5 per cent. of cows were milk recorded.)

The initial £66,000 sunk in buildings, before any pigs were tested at all, would enable a survey of over 10 per cent. of all the pigs in the country to be made on recording lines for a period of 3 years.

Finally, pig recording supplies to the administrator a vastly greater amount of information than is obtainable from litter records, which are necessarily obtained under somewhat artificial conditions. Supplying, as it does, not only the means of improving both management and breeding, but also the intelligence service without which no campaign can be brought to a successful conclusion, pig recording is recommended as a factor of the very greatest importance in the reduction of costs that has been postulated as the best way to increase pig production.

Summary.—1. Provided that pig keeping can be made profitable, there is at the moment a maximum possible expansion involving an annual turnover of £32,000,000, a profit of about £1,600,000, and employment for 80,000 men.

2. In 1932, Danish bacon was being sold in our markets at a loss of over 4s. per score, or approximately 40 per cent. below cost of production.

3. With the exception of a slight advantage, due to a supply of separated milk and, to a lesser extent, of unpaid family labour, Danish costs of production approximate to British.

4. During the five years preceding the recent abnormally low prices, the relative prices of feeding stuffs and baconers

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have been such as to allow of a profit of 1s. per score when management was efficient.

5. During the same period, there has been a loss on British pig production, of from 5 to 20 per cent.

6. Pig recording has shown that this loss is due to poor age-for-weight and fecundity *per sow year*, amounting together to 2s. 7½d. per score.

7. The reductions that can be made in these losses by improving pure-bred stock by means of litter testing are very slow and expensive in their action, and after five years are estimated to amount to only 1s. 2½d. per score.

8. The improvements obtainable by pig recording are greater in extent and more rapid in action. In the course of 3 years' working, the East Anglian Pig Recording Scheme led to a reduction of 38 days, or a saving of 1s. 10d. per score.

9. Litter testing is very expensive. To test 1 per cent. of the breeding sows in the country would require a capital outlay of £66,000 and an annual expenditure of £23,100. The annual income alone would enable 61,600 litters (15 per cent. of sows) to be recorded under pig-recording methods.

10. Owing to the very large numbers of farmers that it reaches directly, pig recording not only influences a much wider field of producers than does litter testing, but affords the administrator accurate information on production methods and costs not otherwise obtainable.

September, 1932.

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FRUIT GROWING IN ESSEX—I

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FOR the last twelve or fourteen years, fruit growing has been one of the most profitable branches of horticulture in the County of Essex. Though the acreage (4,877) is relatively small, the industry is growing rapidly, the technique of the growers is highly developed, and the quality of the fruit produced of the very best. Evidence of quality is furnished by the marked success of Essex growers at the Imperial Fruit Shows in recent years. At the last show (Birmingham, October, 1932) Essex growers won eight of a possible fifteen prizes in the United Kingdom Championship for dessert apple classes. In the British Empire Section

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for culinary and dessert apples, five out of a possible six prizes were also secured by Essex growers, who have now won the dessert class in this Section for three years in succession.

Successful show results are not necessarily a reliable indication of prosperity, or even an accurate guide to developments within a county. Nevertheless, these show successes, especially in the dessert classes, are significant. The fact that the industry is a young one, and that the county has favourable factors in climate and soil, contribute largely to the high standard of production. The tendency of growers has been to concentrate almost entirely on top fruit production, principally apples. Violent fluctuations in soft fruit prices and the very suitable conditions for apple growing have largely determined the line of development. The large amount of capital required for apple growing and the time that must elapse before any returns are realized on the investment, tend, however, to retard progress in a field where there is ample room for expansion. Taking the country as a whole, it may be true that the home orchard area has remained stationary for some time, and that the amount of capital being invested in the fruit-growing industry is less than its prospects justify, but this cannot be said of Essex.

The Development of the Industry.—Apart from the recognized fruit-growing areas of Cambridge, Norfolk, Kent and Devon, Essex easily heads the list of the remaining counties in increased acreage of orchards over the period 1920-1931. The acreage under soft fruits also shows a marked increase over this period, though for the last six years the area has remained more or less constant. All this development has taken place since the War, but the most rapid increase in top fruit has taken place during the last five years, and is still continuing. It is safe to say that a further thousand acres of fruit was planted in Essex this planting season (1932-33).

In tracing the development of fruit growing in Essex, mention must be made of the pioneer work carried out by the late Mr. William Seabrook, and of the influence of his firm on fruit growing in Essex. His keen insight and knowledge of his subject led him to anticipate to some extent the classification of stocks carried out later by the East Malling Research Station. Mr. W. P. Seabrook has since built up

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on that firm foundation a business that has drawn the attention of fruit growers to this county with its possibilities of orchard planting. The county is fortunate in having such a store of experience of the fruit-growing industry at its centre, and it is natural that this influence is easily traced in many of the methods of planting and production of the fruit areas in the county.

At the time when Mr. William Seabrook started his pioneer work, there were very few orchards of any commercial importance in Essex. A few old farm orchards were in existence, scattered over the county, but the increase, starting gradually, has become more intense during recent years, and the fruit areas of the county are more defined. One feature of the development is that entirely new unit plantations are being started, in contradistinction to the expansion of the older fruit farms. In recent years farmers have been turning to fruit and vegetables to tide over the acute depression in agriculture, but the development referred to here is distinct from that. Some farmers in the county are depending on horticultural crops until corn growing is again on a sound and profitable basis, but only a few can afford the outlay necessary for growing apples or other top fruit. The development consists rather in using land that is otherwise of little value to the farmer, and which is now being laid down to fruit by newcomers to the county and to the industry.

The reasons that led the pioneer growers to come to Essex are fundamentally those of climate and soil. The climatic conditions in Essex are characterized by a low rainfall and much sunshine. These two factors, which are so favourable to ripening processes both of wood and fruit, combined with a favourable soil factor, have led to developments of the cultivated orchard with a pronounced bias, at present, in favour of dessert apples.

The chief soil formations in the county are boulder clay and London clay, but there are extensive areas of valley gravel, sand and gravel, brick-earth and alluvium. The soils of practically the whole of the western and north-western sides of the county are heavy, but through the centre, diagonally from Chelmsford to Colchester and on to the Suffolk border, there is a variety of soils, and land to the south-east of this line also varies from valley gravel to heavy clay. The oldest fruit farms in the county are very

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scattered, some of the largest being found at Grays in the south, Brentwood in the west, and Colne Engaine in the north. The more modern farms and the areas where planting is taking place most rapidly, coincide with those districts where a valley gravel and a heavier soil occur on the same farm. The valley gravels grow Cox's Orange Pippin to perfection, soils a little more retentive produce excellent Worcester Pearmain, and the heavy land is suitable for Bramley's Seedling.

The main fruit-growing districts and areas where new plantations are being started lie south-east of the line from Chelmsford to Colchester, bounded by Goldhanger and Maldon on the coast, with extensions up to Great Leighs from Boreham, to the Suffolk border from Colchester, and to Mayland in the south-east from Maldon. The district beyond Colchester, in the Clacton direction, is being planted, but not to the extent found in the centre of the county. The whole of this north-eastern area is a potential fruit-growing district. The western part of the county, although heavy, would grow Bramley's Seedling and Worcester Pearmain well if the land were drained, for the latter dessert variety seems to colour in Essex on the heavy just as well as on the lighter soils.

A less important inducement than suitability of climate and soil, to start apple growing in Essex, is the comparative freedom from canker disease (*Nectria galligena*) and apple capsid bug (*Plesiocoris rugicollis*). Trees do canker in Essex but not nearly to the same extent as in some other fruit-growing districts. The apparent freedom from capsid bug resulted in an application being made by the County Council for an Order giving it powers to enforce control measures on any commercial plantation in which this bug may be found. This Order, The Apple Capsid (Essex) Order, 1932, also makes it necessary for notification to be made of the importation into the county of apples, black currants, or gooseberries. The Order will not stop the entry of the bug, but it may mean earlier detection of its presence, and afford opportunity to stamp it out before it becomes endemic.

The part of the county devoted mainly to the production of soft fruits is the Colchester district. During the last 10 years, strawberries have shown the largest increase in area, currants an almost equal expansion, and raspberries a small

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increase. A canning factory has been established at Colchester, and it remains to be seen what influence this will have on the soft fruit industry in the district. A large part of this expansion of acreage under soft fruits is due to the increase of top fruit, the soft fruits being used to bring in a return while the trees are coming into bearing.

As fruit growing in Essex is expanding so rapidly, and as the industry is so young, it is natural to find that new plantations are being laid down on modern lines and cultivated on the latest methods.

New Plantations.—The usual size of the new plantations is about 50 acres. This is considered an economic unit, justifying the use on the farm of a power-spraying plant, a tractor, and a grading machine. Most growers with a smaller acreage are endeavouring to enlarge their plantations to that size. Expansion well above this acreage is possible without the need of further implements.

Perhaps the most noteworthy change in orchard planting during the last few years has been the adoption of the system of planting in blocks of one variety. Modern research work, principally into the questions of manuring and spraying of apple trees, has put many mixed orchards out of date. There are a number of orchards in Essex, planted only a comparatively short while ago, in which the two varieties Cox's Orange Pippin and Worcester Pearmain are together. The only reasons for mixing them were that they were two good market varieties, cross pollination was achieved, and the alternation of rows of a weak growing variety with a stronger sort allowed a larger number of trees per acre. It is now readily admitted that, from every other view point, it is better to keep the varieties separate, provided the pollination difficulty can be overcome. Growers in the county, who have these two varieties interplanted, are experiencing difficulty in manuring; the high nitrogen requirement of Cox's Orange Pippin being fatal to colour and an open invitation to scab disease in Worcester Pearmain.

All the new unit-sized plantations of apples laid down in Essex during the last four years have been planned on the block system. One variety to a field means economy, individual treatment of the variety, and more accurate recording is possible.

Pollination of the main variety is achieved by planting

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one tree in nine of a variety that flowers at the same time. Doubt has been felt and expressed as to whether one pollinator is sufficient for the eight trees surrounding it. There are, however, in the county examples of Cox's Orange Pippin, grown in this way, setting an excellent crop of fruit. Growers are beginning to keep more bees in their plantations, and the possibilities of a bad set are thereby lessened.

Varieties.—The three varieties that are being planted in very large quantities in Essex to-day are Cox's Orange Pippin, Worcester Pearmain and Bramley's Seedling. The sound propaganda of the leaders of the fruit industry on the vital need for standardization of its products cannot be fully realized until the number of varieties in existence is limited. Planting in Essex is following this sound doctrine. The exceptionally fine flavour of Cox's Orange Pippin, the colour of the Worcester Pearmain, and the sound cooking qualities of Bramley's Seedling are likely to keep these as the three chief market varieties for some time to come. No figures are available showing the acreages put down, in the last few years, to these three varieties, but the area of the two dessert sorts is undoubtedly in advance of all the other varieties put together.

Of the newer varieties, growers are placing greater faith in the cooking variety Monarch. The prices realized by three growers in the county suggest that it is equal to Bramley's Seedling in respect of cooking quality. Its chief value to the Essex grower is that it succeeds very well on the lighter lands where Bramley's Seedling would not be so happy. It also crops regularly; Bramley's Seedling being more uneven. The dessert variety, Laxton's Superb, is also receiving the attention that its merits justify, and in new plantations, a number of growers are using it as a pollinator. The acreage going down to Ellison's Orange indicates rather a tentative attitude to this variety. Of the other varieties, James Grieve and Emneth Early are used as pollinators; and very small quantities of such varieties as Beauty of Bath, Gladstone, Lady Sudeley, Rival and Grenadier are being planted.

Interplanting with Soft Fruits.—As the trend of planting in Essex is definitely towards dessert-apple growing, it is thought to be a necessary evil to interplant with soft fruits to bring in a return while the trees come into bear-

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ing. In some recognized fruit-growing districts, cropping under established trees seems to be the rule rather than the exception. In Essex, the reverse obtains. On a number of unit farms now being planted, the owners are forced to plant soft fruits owing to limited capital, but the attitude of these growers is one of anxiety for the last of the soft fruit and the beginning of the top-fruit production. There are a few more fortunate planters who are able to follow a counsel of perfection and are planting only apples, and others who are planting apples in one field and soft fruits in another.

The main fruits used for intercropping are currants, gooseberries and strawberries. Raspberry, loganberry and blackberry crops are also grown, apple trees being planted at the same time and left to grow as best they can. Where the practice is adopted, the soft fruit is the more important crop, but this treatment is not meted out to the growers' main apple plantations.

Fruit growers fully realize the difficulties encountered in spraying and manuring when soft fruits are combined with apples, and growers who are forced to interplant get rid of their soft fruits as early as possible.

Type of Tree.—Bush apple trees on Types II and IX are the most favoured in Essex. Cordons on either of these two stocks are being planted on a limited scale, but the large majority of planters are using the bush. In a county where dessert-fruit growing is so pronounced, cordon growing might have been expected to have received greater attention from planters than it has. Besides the limitation imposed on this method of fruit production by the high initial capital cost, growers feel that equally fine specimens of high quality, even-sized fruit can be obtained off the bush, which will outlast the cordon even if it does not give quite such quick bulk returns.

Of the two stocks most commonly used, Paradise Type II is used for the majority of bush trees in Essex. The practice of using temporary fillers on Type IX in plantations of permanent bush apples is not a popular system of planting. Difficulty is being experienced by a too close planting of trees on Type IX, and by excess vigour resulting from scion rooting with trees worked on this stock. For Cox's Orange Pippin on the gravel soils of the county, Type II is the best stock, as it is also for Worcester Pearmain on the medium to heavy soils.

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Making a New Plantation.—As fruit growing is a sound investment and a means of relieving in part the depression in agriculture, and as so many inquiries are being made about the cost of establishing a fruit plantation, the following brief summary of the operations carried out, with costs as they apply to this county, may be of interest.

Steam Ploughing and Subsoiling.—On practically all land in Essex it is advisable, and a paying proposition in the end, to disturb the soil as deeply as possible before planting. A subsoiling tine attached to the ordinary steam plough leaves the land in good condition for harrowing down before planting. Preliminary cultivation is also done by tractor.

Wiring.—Wiring is a very necessary precaution against rabbits and hares. Six-foot stakes driven in at about seven-yard intervals form the support for 4 ft. 6 in. wire netting of 18 gauge, and $1\frac{1}{2}$ -in mesh. This netting is buried to a depth of 6 in., the edge being turned outwards to the ditch or hedge. The netting is supported by a straining wire along the top of the stakes.

Cultivation and Marking Out.—After steam ploughing, the land is cultivated to bring it into a fit state for planting, the positions of the trees are marked out by the use of a cross-stave and pegged. The planting distances vary from 12 to 18 ft., according to stock, variety and soil type.

Planting and Mulching.—The trees may be bought as maidens or as two-year-olds, a larger number of maidens usually being planted than two-year-olds. On the heavier soils, the trees are often left unpruned at planting time. All young trees planted receive a mulching in the spring to carry them over the summer months.

Table I gives the approximate planting costs per acre taken from a field of Worcester Pearmain on Type II planted on the block system of 12 acres of the one variety, with currant bushes interplanted. Costs are also given for the second and third year. The apples were maidens planted 16 ft. \times 16 ft. and the red currants 4 ft. \times 8 ft. The costs of mulching are for horse and man labour only and do not include the cost of the dung.

Table II gives the approximate planting costs per acre of Worcester Pearmain, 18 ft. \times 18 ft. from a field of 7 acres.

We are indebted to Mr. J. E. Sidgwick (Lawns Farm, Great Leighs, Chelmsford) for supplying the figures in Tables I and II.

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Table III gives the approximate planting costs per acre of Worcester Pearmain, planted, as maidens, 16 ft. × 16 ft., with black currants interplanted at 8 ft. × 8 ft. We are indebted to Messrs. W. Seabrook & Sons, Ltd., for these figures.

The question is often asked—how much capital is required for fruit growing? Most growers in this county are of the opinion that £100 or more per acre is necessary to cover the capital costs of the plantation until a working profit is obtained.

TABLE I.—PLANTING COSTS PER ACRE OF WORCESTER PEARMAIN INTERPLANTED WITH RED CURRANTS.

	1929-30.	1930-31.	1931-32.
	£ s. d.	£ s. d.	£ s. d.
Steam cultivation	1 10 0	—	—
After cultivation	0 15 0	1 13 0	2 10 0
Hoeing	—	1 0 0	1 0 0
Wiring	2 6 0	—	—
Mulching	0 13 4	0 13 4	—
Manuring	—	—	1 10 0
Planting	1 5 0	—	—
Cost of trees	9 7 0	—	—
Cost of current bushes ..	12 10 0	—	—
Pruning	0 1 0	0 2 0	0 6 0
Spraying	—	0 5 0	0 10 0
	<u>£28 7 4</u>	<u>£3 13 4</u>	<u>£5 16 0</u>

TABLE II.—PLANTING COST PER ACRE OF WORCESTER PEARMAIN.

	£ s. d.
Steam cultivation	1 10 0
Wiring	2 10 0
Mulching	0 14 6
Planting	0 10 0
Cultivation	1 0 0
Cost of trees	7 13 6
	<u>£13 17 6</u>

TABLE III.—PLANTING COSTS PER ACRE OF WORCESTER PEARMAIN INTERPLANTED WITH BLACK CURRANTS.

	£ s. d.
Cost of trees	9 7 0
Cost of currant bushes ..	8 13 2
Steam ploughing, subsoiling ..	2 10 0
Wiring in	1 5 0
Cultivation	2 0 0
Marking out, planting, mulching ..	2 5 0
Staking	1 5 0
After cultivation	1 0 0
Supervision and sundries ..	1 10 0
	<u>£29 15 2</u>

(To be concluded)

TEN YEARS OF FRUIT TESTING

WHILE many careful performance tests have been made of different varieties of farm crops, such as cereals and potatoes, and the results recorded for the guidance of growers, very few such tests had been carried out, until recent years, in regard to varieties of fruit, the long-life history of fruit trees presenting difficulties that do not obtain with annual and biennial crops. Apple trees, for example, have a normal life of 50 years or more, of which some years must elapse after planting before the trees come into full bearing and their merits can be assessed. Thus a considerable waste of time and effort is entailed over a variety that eventually proves to be unsatisfactory. Growers have had to risk such loss, however, because so little information on varietal performance has been available.

Yet the need for proper performance tests of fruit was recognized over a century ago by Thomas Andrew Knight. This pomologist sent 100 trees of his seedling apples and pears to the gardens, in London, of the Horticultural Society, where they bore fruit and were officially reported upon in 1827 and in 1830. The Society does not seem, however, to have extended these trials to other seedlings, or to have instituted any other official tests of fruit trees until the early post-War years, by which time interest in fruit growing had greatly increased in this country, although quite a number of growers had incurred losses through planting new and much-advertised varieties that proved unsuitable for commercial plantations.

As a consequence of this last fact, the Ministry of Agriculture and Fisheries agreed, in 1922, to co-operate with the Royal Horticultural Society in carrying out a scheme for testing varieties of hardy fruits. It was arranged that the Society's gardens at Wisley should be used as a central station where all varieties would be planted first with the object of weeding out the unsatisfactory sorts. Varieties that proved satisfactory from the commercial standpoint were then to be planted at sub-stations in fruit-growing areas, where they would undergo further tests. This scheme of testing has now been in operation for 10 years and some conclusions have been reached.

The initial problem was to decide upon the number of trees, bushes or plants of each variety needed to give a

TEN YEARS OF FRUIT TESTING

fair test, for it was clear that the behaviour of single specimens would be quite misleading. The Committee finally decided that there should be 40 tree fruits (20 on a vigorous and 20 on a dwarfing stock), 20 bushes of the berry fruits, and 100 plants of strawberries. It was impossible to forecast whether these numbers would really suffice to give a suitable test, or whether they would be too many for the land available, but it was considered that the actual trials would afford guidance on these points.

All the trees and bushes are given a fair chance in these trials, for the soil is kept under clean cultivation, the manuring is on modern lines, and the trees are sprayed to keep pests and diseases in check. Under this regime, apple trees of such standard varieties as *Bramley's Seedling*, *Ontario* and *Cox's Orange Pippin*, *Seabrook's Black currant*, etc., are giving excellent crops of very clean fruit. The crops of *Cox's Orange Pippin*, on 80 trees, have been extraordinarily heavy and exceptionally clean. (Fig. 1.)

The advantages of the trials have appealed to breeders of fruit, who have submitted for testing no fewer than 110 varieties of apples, 9 of pears, 22 of plums and damsons, 9 of cherries, 21 of red currants, 18 of gooseberries, 51 of raspberries, and 50 of black currants. Time is needed, of course, for the fruits to show results. Heavy crops from the apples cannot be expected until after the 6th or 7th year, so that, for the early plantings of this fruit, the trials have now reached an interesting stage. The bush fruits give quicker results and, for some varieties, the tests have already been completed.

Apples.—Of the new varieties planted, some have proved of little value for commercial purposes; many show no superiority to older kinds; whilst only a few were deemed of sufficient merit to justify further trial at the sub-stations. The first new apple of noteworthy performance is *Laxton's Superb*, a dessert variety to follow *Cox's Orange Pippin* in season. At Wisley, all the 80 trees of *Laxton's Superb* have grown well and yielded heavy crops of clean apples during several seasons. The apple lacks the distinctive flavour of *Cox's Orange Pippin*, but it is a pleasant-tasting fruit for consumption in January or even later.

The outstanding cooking apple has been the *Arthur Turner*, an early variety very suitable for market purposes. Trees of this variety have borne regular crops in August,

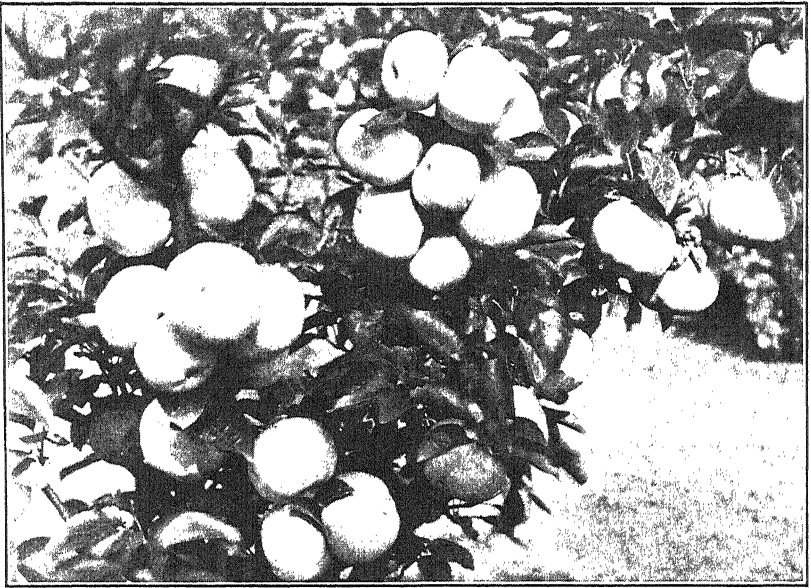


General View of the Fruit Testing Plantations, Wisley.



A heavy crop of *Cox's Orange Pippins*.

Photos: R. A. Malby



A well-laden branch: *Ontario* apples.

Photo: R. A. Malby



TEN YEARS OF FRUIT TESTING

the fruits being of large size and exceptional weight; and, if the standard of performance is maintained, the variety will undoubtedly become popular with commercial growers. Apples of the dual-purpose type are not now much favoured, but *Herring's Pippin*, a variety sent for trial by Messrs. Pearson, is very attractive.

Plums.—Of the large number of plums entered for trial, only one will be mentioned here—*Early Laxton*. Trees of this variety at Wisley are spreading and of medium size, but they have shown a capacity to produce heavy crops early in the season, the fruit ripening a week or ten days in advance of *River's Early Prolific*, growing nearby. The *Early Laxton* is also good for canning, the fruit resembling that of the *Victoria*.

Tree Fruits Generally.—The foregoing are the first results for tree fruits. Other bad, fair or even good performers must be passed over for reasons of space, whilst the newcomers must stand over until the next report. Most of the new varieties are still under trial, and their performance can only be determined in course of time.

Bush Fruits.—The varieties of bush fruits have now yielded crops for some years, both at Wisley and at the sub-stations, and records are available by which their performances can be judged. It is not proposed here to review all the statistical information that has been drawn up for the purpose of comparing the performance of one variety with another at each of the various centres, but this has, of course, been done for the purpose of assessing respective merits.

Black Currants.—The tests have demonstrated that the position held by the four standard varieties, *Baldwin*, *Boskoop Giant*, *Seabrook's Black* and *Goliath*, is not immediately challenged. Of late-ripening currants, *Daniel's September Black* has given the best performance. *Supreme* and *Wallace Seedling* show promise of becoming rivals to *Baldwin*. *Davidson's Eight* gave excellent crops at some centres but less satisfactory results at others, and its success seems to depend upon conditions being favourable to it. *Boskoop Giant* proved to be still the best of the early varieties.

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Raspberries.—The testing of raspberries is difficult. Many varieties have been tested in these trials, and much thought and care have been given to each of them. A variety may produce wonderful crops but fall short in having soft berries or berries that turn "blue" in ripening. A variety that shapes excellently at the beginning of the test may deteriorate rapidly through a "virus" disease and pass out of favour in a few years.

The three most satisfactory varieties in the trials proved to be the old and well-known *Lloyd George*, *Red Cross* and *Pyne's Royal*. Of the new late varieties, the *Norfolk Giant* was the heaviest cropper. *Lynn's Superb* has some merit for planting in private gardens. Included in the trials was a variety called *Ellis*, the canes of which were affected with "virus" and grew badly, while the berries were rubbery and bluish in colour. It seemed worthless for commercial purposes, yet proved excellent for canning and for good colour stood in a class by itself.

Red Currants.—Not many red currants were originally entered for trial, but of these *Laxton's No. 1* (mid-season) and *Earliest of Fourlands* (early) gave the most satisfactory performances.

Generally.—These few notes will give some idea of the trials and of the varieties that showed to most advantage in them. It is not possible here to review all the other varieties that figured in the results as "just good," "fair" or "poor." Fuller particulars are given in a report published by the Royal Horticultural Society.*

The full lessons of the trials, however, are only to be learnt by viewing the trees and bushes under crop, and comparing the crops of the different varieties of each fruit under test. A visit to the Wisley centre at the appropriate season would prove both interesting and instructive to those who are interested in fruit culture.

* *Jour. Roy. Hort. Soc.*, Vol. LXII, No. 2, September, 1932, pp. 246-284.

MARKETING NOTES

Agricultural Marketing Bill, 1933.*—A new Bill dealing with the marketing of agricultural products was introduced in the House of Commons on March 6. Major Elliot moved the Second Reading on March 13 and the debate on this stage of the Bill was concluded on March 20.

As its title suggests, the Bill is a development from the Agricultural Marketing Act, 1931. It is divided into four parts, the main provisions of which are briefly explained below.

Part I deals with the regulation of supply which, in some cases, is necessary to secure the effective reorganization of marketing and the stabilization of markets. Regulation of supply involves regulation of the two tributaries of the market-stream, namely, imports and supplies from home sources. Clause 1 accordingly empowers the Board of Trade to regulate the importation of a product if it appears that such action is necessary in order to enable the reorganization of a branch of the agricultural industry by a scheme under the Act of 1931 to be fully effective; and Clause 2 empowers the Ministers responsible for agriculture in the United Kingdom to regulate the home output of any product which is the subject of an import Order under Clause 1. These Clauses enable effect to be given to recommendations of the Reorganization Commission for Pigs and Pig Products.† The possibility of proceeding by voluntary agreement rather than by compulsory Order is not precluded. Provision is also made in this part of the Bill for the appointment of a Market Supply Committee whose chief function will be to make a continual and expert study of supply problems, which the policy of supply regulation must solve, and to advise the Ministers in the exercise of their functions in that connexion.

Part II also gives effect to the recommendations of the Reorganization Commission for Pigs and Pig Products. It provides for the joint exercise of power by producers of a secondary product (e.g., bacon) and of a primary agricultural product (e.g., pigs), being the raw material of the former product, and for the organization by these

* Obtainable through any bookseller or from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 6d., post free 7d.

† Report of the Reorganization Commission for Pigs and Pig Products: Economic Series No. 37. Obtainable from H.M. Stationery Office, price 6d., post free 8d.

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producers of the production of the secondary product. The method by which producers can acquire these powers follows the democratic precedent set by the 1931 Act, that is to say, they are enabled to submit a scheme constituting a development board equipped with such powers, within the scope of Clause 6 of the Bill, as the scheme may provide.

Part III and the Third Schedule contain a number of amendments to the 1931 Act, the desirability of which had been suggested by the experience of the Reorganization Commissions for Milk and for Pigs and Pig Products and of the Hops Marketing Board; and Part IV contains a number of miscellaneous and supplementary provisions, one of which, limiting validity of contract in the sale of eggs to transactions conducted on the basis of weight or statutory grade, is designed to meet, in some degree, the generally-expressed desire for further legislation to encourage the standardization of egg-grading.

In the course of his opening speech, the Minister of Agriculture said:—

“ We have three tasks before us. The object of the Government, first of all, if it can be done, is to hold and to improve the position of British agriculture. Secondly, we have to reconcile our work with world economics in order to make our contribution to the very difficult questions which are being placed before economists and statesmen in connexion with the present economic chaos which weighs on the exchanges and on the markets of the whole world. And, thirdly, we have to see whether it is possible—as I believe it is possible—for agriculture to give a lead to the twentieth century State in organization and development, so that it may pass from being the least organized of industries to the most adequately organized of industries, and we may be able to secure partnership between the producer, the processor and the distributor, which is one of the great problems of our time and leads to a continuous course of dispute, growing more and more acrid as time goes on.

“ The proposals which we bring forward are admittedly drastic, far-reaching and novel, and our only justification for them is that they are not more drastic than the situation demands, that they are not more novel than the circumstances which confront us, and that they are not more

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far-reaching than the emergency which has brought them into being."

Major Elliot pointed out that the fall in agricultural prices had been specially intense in this country because "as continent after continent closed its doors against agricultural imports, they came in increasing velocity upon our shores; so that in addition to meeting the competition of the selected man, producing the selected products upon the selected day, our producers had to meet what was nothing more or less than a series of bankrupt sales. Between 1929 and 1932, prices in the chief exporting countries had fallen to a half. The decline in industrial prices was immediately reflected in a decline in the output of industrial products, but a decline of 50 per cent. in agricultural prices was only accompanied by a 1 per cent. diminution in agricultural production, and this in spite of the fact that it was becoming increasingly evident that the world was not able to absorb the quantity of agricultural goods which were being offered.

"It is no longer the national policy to buy all over the world in the cheapest market, because we cannot afford it. That is a great lesson which we have learnt to-day. We intend to ensure that British agriculture shall continue to thrive, and, if we can ensure it, to flourish. Other countries have the power to say that Britain shall no longer be the workshop of the world and to lock us out of the factories." As they do this "they send us into the fields, and they may well consider what will happen if the whole weight of the power, the skill, the inventive genius and the sympathy with the soil which the British have shown in the past, are flung back into the ancient industry of agriculture, in which this country is not second to any, and from which it was temporarily seduced for 50 years because there were other much more amusing and profitable things in the factories, the mines and the workshops upon which to engage." We have to consider how other countries have put up barriers against our goods and we have to take it for granted that, although with great difficulty we might succeed in moderating them, all those barriers will not in future be swept away.

Major Elliot went on to say that the proposals in the Bill dealt with the whole of the market—not with half the market. The market could not endure if the British pro-

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ducer was the only one to organize, the only one to submit to all the incidental difficulties of organization and the only one to be regulated. It was, therefore, a Bill which was commended with the utmost confidence to the House, the country and the industry, and unless we had the support of the industry it was useless to expect the proposals to work. Since producers had realized that they would not be alone in being asked to regulate, a new spirit had been engendered. While only one marketing scheme was at present in operation, nine more schemes had been brought forward, almost entirely, he suggested, because of the promise held out to farmers that, if they would organize at home, the Government would see that the organization was not swamped by imports.

The Minister referred to the negotiations for the quantitative regulation of meat imports and said "they were examples of what could be done in the way, first, of getting hold of the home market by ensuring that supplies were not thrown on that market which it was impossible for it to absorb, and, secondly, they were an example of the possibilities of coming to agreements with foreign countries even though it involved some restriction upon the imports from those foreign countries, which not only could be carried through in a friendly and equitable manner, but were, in fact, welcomed by the suppliers to the market as a whole as bringing a touch of order into a position which had previously been one of chaos. We must deal with these things as a world market, and Britain as a world market is not merely concerned with the import side but is also concerned with the export side of her trade. It is, therefore, necessary for us to see if we can bring forward a scheme which can be shown to be not merely advantageous to Great Britain herself, but to bring order where there is chaos, and therefore make our contribution towards the stability of world trade. The proposals in this Bill have been framed with an eye to that possibility. We shall ensure . . . that the whole question of British trade, both import and export, is most thoroughly taken into account in making any regulations under the Bill.

"We have hopes that we shall be able to do these things and yet preserve our friendship with foreign countries. A remunerative level of prices is an advantage to all the suppliers of the market and an unremunerative level is not an

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advantage to anybody; nor is an unremunerative level an advantage to the consumer himself."

In referring to the development schemes which are dealt with in Part II of the Bill, the Minister said that the keynote of a development scheme was organization of secondary production. Organization of sales was the only organization which was being attempted for primary products, but, under the Bill, the organization of production could be taken in hand for secondary products. At the moment, bacon and hams were the only secondary products in mind in this connexion, but there were others, such as, perhaps, canned fruit and vegetables, to which this part of the Bill might be found intensely useful. The development scheme for bacon and hams arose out of the Report of the Reorganization Commission for Pigs and Pig Products, and there were many new principles of economics in that Report, to the authors of which the House and the agricultural industry owed the utmost debt of gratitude. He suggested that the proposal for a Development Board, which would bring together the producers and the processors would be found to be the most fruitful of them all; and it would be noticed that it had been accepted spontaneously by the producers of pigs and of bacon.

Schemes under the 1931 Act for regulating the marketing of bacon and of pigs were at present being considered; the first was drawn up by the Food Manufacturers' Federation and the second by the National Farmers' Union—not by the Government. These schemes would come before Parliament for acceptance or refusal, but not for the particular control by Parliament of every detail of the industry. This was the proper way in which schemes should be evolved and in which they should find legislative sanction.

In conclusion, Major Elliot said: "We believe that our problem is not only a problem of currency and of exchanges, but a problem of quantity, and that unless we tackle the quantities we shall not be able to tackle the currency and exchange problems, which expressed those quantities. We deal here with huge and important trades, themselves greater, even in their minor manifestations, than many of the trades which excite much more sympathy in this House and in the country. . . . Production has been increasingly expanding . . . and we shall have to deal with the problem of the necessity for expanding consump-

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tion as well as dealing with the problem of restricting supplies and we have to be sure that when British farmers have produced their products it is possible for them to sell those products at a remunerative price.

“ We have a great industry to deal with; we have the food of our people under consideration; and more than anything else, we have agriculture as a mode of life—the ancient power of man to till the soil and extract nourishment therefrom. We may do well or we may do ill, but we are sincerely tackling a very great problem. If fortune smiles on us, we shall have done something really great, perhaps greater than many other more spectacular things which we are discussing in these days. If we fail, we shall have tried, and in these days any failure may be pardoned if it is accompanied by effort and there is no lassitude. But nothing in the way of abandonment, of folding of hands, will be forgiven now either by this House or by the country.”

Milk Marketing Scheme.—A scheme, under the Agricultural Marketing Act, 1931, for the regulation of the marketing of milk in England and Wales, has been submitted to the Minister of Agriculture and Fisheries. The scheme is based on the recommendations contained in the Report of the Reorganization Commission for Milk.*

Copies of the scheme may be obtained, on payment of sixpence per copy (post free), from the Secretary, National Farmers' Union, 45, Bedford Square, London, W.C.1, or may be inspected on personal application at the before-mentioned address (except on public holidays) between the hours of 10 a.m. and 5 p.m. on week-days, and 10 a.m. and 12 noon on Saturdays. Any objections and representations with respect to the scheme should be addressed to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, so as to reach him not later than May 2, 1933; objections received after that date will not be considered. Every objection must be made in writing and must state the grounds of objection and the specific modifications required.

National Mark Schemes for Fresh Fruit.—The Ministry proposes, during the coming season, to introduce schemes for the marketing, under the National Mark, of

* Economic Series No. 38. Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 6d., post free 10d.

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gooseberries, loganberries, raspberries, red currants and black currants.

In consequence of the growing demand by retailers and others for National Mark fruit and vegetables, and in order to facilitate and develop distribution, the Ministry has decided to compile, for the information of producers and retailers, a list of wholesale distributors who are prepared to deal in produce packed under the National Mark. It is clear that if such a list is to be of real value to the retail trade, there must be some guarantee that the firms listed are in a position to meet demands for National Mark fruit and vegetables. It has been decided to register the firms concerned, and, on their undertaking to comply with the conditions, which *inter alia* require a specified minimum turnover of National Mark fruit and vegetables, to provide them with certificates of appointment as registered distributors. Forms of application for registration, and details of the conditions, may be obtained from the Ministry. A number of applications have already been received and it is anticipated that this new development will provide a valuable stimulus to grading and packing fruit according to National Mark standards.

National Mark Cauliflower and Broccoli.—Considerable interest in the National Mark Scheme for cauliflower and broccoli has been shown by growers, especially in Cornwall and Devon, and although the scheme only came into operation on February 21, 1933, 39 growers have already enrolled.

National Mark Canned Fruit and Vegetables.—The operation of this Scheme during the past season was recently reviewed by the National Mark Canned Fruit and Vegetables Trade Committee and recommendations were made designed to ensure that only first-class produce is sold under the National Mark. The Committee considered that the time had arrived when the scheme should be strengthened and provision made for the definition of standards for size of fruit and vegetables, weight of fruit in cans, and syrup strengths. Particulars of the suggested standards will accordingly be furnished to all authorized canners, who will be notified that these standards are recommended for observance and will be used during 1933 as a basis for reports on samples. The Committee were of the opinion that the standards should be made compul-

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sory for all National Mark canners in 1934.

The following additional varieties of fruits have been approved for inclusion in the Scheme:—Plums—Early Laxton; Cherries—Kentish Bigarreau, Kentish Red, Flemish Red and May Duke. As regards blackberries and strawberries, for which, hitherto, no particular varieties have been specified, the following have been approved:—Blackberries—Himalaya Giant and Black Diamond; Strawberries — all commercial varieties (except Bedford Champion, Huxley, Madame Lefebvre and Madame Kooi, and any other varieties that may be excluded by the Ministry from time to time).

The following additional packs of fruit will be permitted:—Apples (solid pack) in A $2\frac{1}{2}$ -size can; apples (in syrup) in A $2\frac{1}{2}$ -size can; halved Victoria plums.

Export of National Mark Canned Fruit and Vegetables.—Recent inquiries among canners and wholesale distributing firms have indicated successful experiences in the export of fruit and vegetables canned in this country under the National Mark. One firm's decision, two years ago, to send samples to prospective buyers abroad led to consignments of from 300-400 cases of canned fruit and peas being shipped in June, 1932; in January last, over 1,000 cases were shipped. Consignments have been sent to India, Malay States, Egypt, China, Barbados, Trinidad and Malta. One consignment of peas was shipped to Japan, and inquiries have recently been received from the United States, Canada and New Zealand.

National Mark Bottled Fruit and Vegetables.—This Scheme was discussed recently at a joint meeting of the National Mark Bottled Fruit and Vegetables Trade Committee and a Sub-Committee of the Food Manufacturers' Federation, when it was agreed that more intensive steps should now be taken to develop the Scheme and to bring it to the notice of distributors and the general public.

Certain amendments to the Scheme were agreed upon and arrangements were made to discuss later the questions of size grades for gooseberries and plums, syrup strengths, capacities of fruit bottles and suitable types of vegetable containers.

Marketing Demonstrations at Agricultural Shows.—The following is a list of the Agricultural Shows at which the Ministry proposes to exhibit during the forthcoming

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season. The main feature of the Ministry's pavilion will be a display illustrating all existing National Mark schemes. Demonstrations of proposed new National Mark schemes for gooseberries, raspberries, loganberries, red and black currants, asparagus and carrots will be included in appropriate areas and at appropriate seasons:—

<i>No.</i>	<i>Show.</i>	<i>Place.</i>	<i>Date.</i>
1	Bath and West	Wimbledon	May 24-27
2	Hunts	Ramsey	May 25
3	Royal Counties	Bournemouth	May 31—June 3
4	Suffolk	Bury St. Edmunds	June 1-2
5	Three Counties	Worcester	June 6-8
6	Northants	Kettering	June 7-8
7	Staffordshire	Stoke-on-Trent	June 14-15
8	Herts	Hatfield	June 15
9	Norfolk	King's Lynn	June 21-22
10	Royal	Derby	July 4-8
11	Kent	Maidstone	July 13-15
12	Northumberland	Alnwick	July 19
13	Bedfordshire	Amphill	July 20
14	Royal Welsh	Aberystwyth	July 26-28
15	Royal Lancs	Salford	August 3-7
16	Harrogate	Harrogate	August 7-8
17	Denbigh and Flint	Mold	August 17
18	Craven Arms	Craven Arms	August 12
19	Anglesey	Llangefni	August 31
20	Southport Flower	Southport	August 23-25
21	Evesham	Evesham	August
22	Monmouthshire	Monmouth	August 31
23	Brecknockshire	Brecon	September 9
24	Altrincham	Altrincham	September 20
25	Thame	Thame	September 21

Demonstrations of the National Mark schemes for broccoli and cauliflower and for cabbage lettuce will be staged at the Central Market, Evesham, on April 3, 5 and 6, and at the Tamar Valley Spring Show, Plymouth, on April 19-20. The proposed scheme for asparagus will also be demonstrated at the former place.

Appropriate National Mark produce will be included in the Early Market-Garden Produce Show to be held in the Royal Horticultural Society's Hall, Vincent Square, London, S.W.1, on April 26 and 27.

Publicity for National Mark Products: *London National Mark Eggs Window Dressing Competition.*—Upon the recommendation of the judges, the following awards were made in the National Mark Eggs Window Dressing Competition held in London during the week March 6-11:—

1st Prize (£25).—Royal Arsenal Co-operative Society, Ltd., 50-52, Rushey Green, Catford, S.E.6.

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2nd Prize (£20).—Express Dairy Co., Ltd., 239, Golders Green Road, N.W.1.

3rd Prize (£15).—Royal Arsenal Co-operative Society, Ltd., 147, Powis Street, Woolwich, S.E.18.

4th Prize (£10).—Messrs. Waitrose, Ltd., 21-23, Gloucester Road, South Kensington, S.W.7.

Eleven other competitors were specially commended by the judges for their displays and were awarded diplomas.

The competition was open to all retailers of eggs in the London Postal Area, and attracted 120 entries. As the result of preliminary judging on Tuesday, March 7, 25 of these displays were selected for final inspection on Thursday, March 9, by a committee of judges consisting of Mr. C. L. T. Beeching, O.B.E., Mr. C. A. W. Freyer and Mr. F. W. Gilbert.

The judges were of opinion that the competition achieved its purpose in providing valuable publicity for National Mark eggs at a time when English eggs are very plentiful, and were impressed by the way in which the windows attracted the attention of passers-by. They regarded the entries of the winners as of exceptional merit and had some difficulty in selecting the displays for special commendation on account of the general high level attained.

The chief criticism made by the judges was that the majority of the displays did not emphasize sufficiently the selling points of National Mark eggs, viz., that they are tested eggs of first quality, and that the four weight grades—Specials, Standards, Mediums and Pullets—represent eggs of a certain minimum weight— $2\frac{1}{4}$ oz., 2 oz., $1\frac{3}{4}$ oz., and $1\frac{1}{2}$ oz., respectively. In some instances, points were lost because the colours used were too mixed and tended to distract attention from the main purpose of the display, which was to sell National Mark eggs. Other competitors would have gained rather than lost if they had dispensed with accessories not related in any way to eggs or poultry farming.

Regulation of Imports of Bacon and Hams.—Reference has been made in recent issues of the JOURNAL* to the "gentleman's agreement" reached with the principal foreign bacon-exporting countries to the effect

* January, 1933, p. 902, and February, 1933, p. 990.



London National Mark Eggs Window-dressing Competition, March 6-11, 1933. Display by the Royal Arsenal Co-operative Society, Ltd., 50-52, Rushey Green, Catford, London, S.E., which was awarded the First Prize.

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that, for the period November 23, 1932, to January 22, 1933—subsequently extended to February 22, 1933—shipments of foreign bacon and hams into the United Kingdom would be reduced by about 15 per cent. compared with the previous year. The Customs entries for the thirteen weeks ended February 21 show that the agreement has been generally observed; the total quantities of bacon and hams imported from the countries concerned (without allowing for re-exports) was actually slightly short of the total anticipated.

In reply to a question in the House of Commons on March 9, the Minister of Agriculture stated that, as the result of further negotiations with representatives of the chief exporting countries, the shipments of bacon and hams to this country during the month ending March 22, 1933, would be limited, as far as practicable, to the following quantities:—

					<i>Cwt.</i>
Denmark	..	..	..	..	493,300
Sweden	..	..	..	..	37,600
Netherlands	..	..	..	..	80,300
Poland	..	..	..	..	79,500
Lithuania	..	..	..	..	39,000
Estonia	..	..	..	..	7,000
Finland	..	..	..	..	4,300
Latvia	..	..	..	..	4,000
U.S.S.R.	..	..	..	..	4,000
Argentina	..	..	..	..	5,900
U.S.A.	..	..	..	..	51,500
					<hr/>
					806,400

These figures include adjustments to meet seasonal fluctuations. The negotiations were continuing in respect of shipments for the further period of three months ending June 22, 1933.

Schemes Regulating the Marketing of Pigs and Bacon.—The inquiry into objections to the Pig Marketing Scheme opened at the Middlesex Guildhall, Westminster, on March 24. The Bacon Scheme inquiry followed on March 29. Both inquiries were held by Mr. S. L. Porter, K.C., the Commissioner appointed for the purpose by the Minister and the Secretary of State for Scotland.

Wheat Act, 1932.—On March 25, the Wheat Commission made a second payment in advance to registered wheat growers throughout the United Kingdom, on account of deficiency payments that will become due to them under

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the Wheat Act. The advance was at the rate of 3s. per cwt., equal to 13s. 6d. per quarter of 504 lb., and was in respect of wheat certificates lodged with the Commission during the period Dec. 1, 1932, to February 28, 1933. No further advance was made in respect of certificates delivered up to November 30 last, on which the first advance was made. The Commission have announced their intention to make a third payment in advance in due course in respect of wheat certificates delivered to them after February 28.

Certificates lodged with the Commission up to and including March 10 covered 14,664,389 cwt. of millable wheat of the 1932 crop, the average selling price per cwt. (at farm) being 5s. 4d. The total sales up to July 31 next have been estimated for the purposes of the Wheat Act at 19,800,000 cwt.

The 1932 Sugar-Beet Crop.—A preliminary survey of the results of the 1932-33 beet sugar manufacturing season in England and Wales indicates that, as regards production, the past year compares favourably with 1931. The area under sugar-beet in 1932 was 254,983 acres, an increase of more than 20,000 acres over the area planted in the preceding year. The increase, however, was by no means on a uniform scale throughout the country. While eastern (particularly Norfolk) and east-midland districts recovered most of the acreage lost in 1931, as compared with the record year of 1930, west midland and northern districts showed further reductions.

Weather conditions at the time of sowing were unfavourable. In a few cases, early sowings were possible but planting operations generally were impeded by the heavy rains which persisted throughout April and most of May. In some areas, particularly in western districts, planting was not completed until the first week of June. Even where early sowings had been made, the cold and wet conditions which followed retarded germination and delayed field work.

With the advent of more favourable weather in June, the crop made rapid progress. In September, however, cold and wet conditions again set in and continued up to the end of October. These inclement conditions, coupled with abnormally heavy top-growth, retarded ripening, and at that stage the sugar-content of the roots was consider-

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ably below average. At the end of October, however, ideal conditions set in and the sugar-content of the roots increased, though the final figure remained below average.

The total quantity of beets delivered to the factories was about 2,226,000 tons, as against 1,662,752 tons delivered in 1931. The average yield per acre was 8.7 tons, almost equalling the 1930 figure of 8.8 tons, the highest average recorded in this country. The average sugar-content was 16.9 per cent. as against 17.3 per cent. in 1931. The dirt tare—14.3 lb. per cwt. of beet—was lower than usual.

The production of commercial sugar—2,896 lb. per acre—was the highest yet recorded, exceeding the figure for 1931 by more than 480 lb. The extraction of sugar expressed as a percentage of the weight of beets delivered was 14.7 per cent. Though substantially less than in 1931, the rate of extraction is satisfactory having regard to the lower sugar-content of the roots.

The quantity of dried pulp produced was 159,000 tons, comprising 48,000 tons of plain and 111,000 tons molassed, of which 1,000 tons was exported. The production of wet pulp was 25,000 tons. The output of molasses was about 1,560,000 cwt.

Sweden: Promoting the Sale of Agricultural Products.—Swedish producers, faced with a reduced demand for their products and a corresponding decrease in purchasing power, which has in turn affected other industries, have recently combined to remedy this state of affairs.

An Association has been formed in Stockholm, the main object of which is to promote the sale of Swedish foodstuffs by stimulating interest in home products and by securing that the public shall be able to distinguish them from those of foreign origin. It is proposed to do this by adopting more up-to-date methods of marketing, which will ensure that products are of high quality and suitably and attractively packed, and by educational publicity. Companies, agricultural societies and trade associations, as well as individuals, are eligible for membership.

It is intended later to extend the Association's activities to include marketing investigations, the standardization of agricultural products and, possibly, an investigation into the margin between the prices received by producers and those paid by consumers.

APRIL ON THE FARM

WILLIAM LAWSON, M.B.E., N.D.A., N.D.D.,

Director of Agriculture for West Sussex.

Arable Land.—Sowing of cereal crops will still continue. Late sown crops, however, are uncertain in their success, and good tilth and adequate manuring must be provided to encourage rapid growth of the crop. As soon as sheep feed is cleared the land should be ploughed and sown as quickly as possible. A good practice is to plough, press and sow the land all on the same day and to keep as close to the sheep fold as possible.

The sowing of grass and clover seeds should not be delayed. It is most beneficial to the small seeds for sowing to be done before the cereal nurse crop comes through the ground. This enables a better tilth to be prepared, and the grasses and clovers get a good start and are not so likely to be smothered by the cereal crop. Some farmers object to the success of the young seeds on account of the trouble that may arise in difficult harvest weather. This is true in some years, but early sowing on the whole is the best practice. Where grass or clover seeds have to be sown in an autumn-sown grain crop, the small seeds should be sown particularly early in the endeavour to ensure success.

Rolling.—Rolling of cereal crops can be very beneficial, but there are conditions where heavy rolling is positively harmful. In some districts the main object of rolling is to level the ground and in particular to put down stones so that they will not interfere with harvest operations. Generally, however, the rolling is done to firm the soil to ensure continuous steady growth of the crop. Land ploughed at or about seeding time requires more consolidation, and the use of the furrow presser is very effective, and particularly valuable when late ploughing and sowing are unavoidable.

Land that has been ploughed for some time before seeding takes place may have become sufficiently consolidated to suit the crop requirements, and subsequent rolling may or may not be required. Generally, light land requires the heaviest roller and rolling can seldom do damage; on heavy land, on the other hand, the roller should be used with discretion and may even be withheld without causing loss of crop.

The opinion is widely held that rolling will prevent or diminish the ravages of wireworms. This is doubtless true up to a point, but rolling should not be carried so far as to produce consolidation greater than that required for the most favourable growth of the crop. A case in point was brought to the writer's notice some years ago; a field of spring oats was being severely damaged by wireworms and the whole field was top-dressed with nitrate of soda; in addition, part of the field was rolled with a fairly heavy roller. The crop over the whole field recovered, and the damage by wireworms apparently ceased, but the portion of the field that was not rolled grew the more vigorously, and in comparison the crop on the rolled portion was decidedly stunted. Another important practical consideration in connexion with rolling is the stage of growth of the corn crop when the operation is performed. On land likely to "cap" the most advantageous plan is to use a medium weight ring roller just when the cereal is nearly ready to come through the ground. In all instances rolling should be done before the cereal is too far advanced, or damage will be done.

Preparing for Roots.—The preparation for root crops is partly a preparation of a suitable seedbed and partly the cleaning out of annual and perennial weeds. As much of the cleaning as possible should have been done in the autumn months, especially on heavy soils, and where this has been done the object now is to secure a suitable seedbed.

After efficient autumn cleaning, and if a rough furrow has been exposed all the winter, the disc harrow can produce a very good tilth. In any event, only light cultivation should be carried out on heavy soils, as it is very necessary to avoid losing the finer tilth that has been produced under the influence of weather. On light soils such a simple practice is not so successful; on such soils weeds ploughed under in autumn do not rot so readily as on heavy soils, especially in mild winters, and further cleaning is usually advisable in spring. On any free-working soil there is less need to worry about the loss of tilth that follows the ploughing down of the weathered soil, as under ordinary weather conditions a new tilth can be created by the tillage implements in time for seeding. Provided there is no undue loss of moisture the more cultivation the medium and light soils receive, the better will the root crop succeed. Loss

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of moisture is brought about more by ploughing than any other operation, and in dry weather land should not be left in the furrow but should be rolled and harrowed at once so that as little of the soil as possible is exposed to the drying influence of sun and wind.

With regard to the final cultivations for seeding and the treatment of the land at seeding, there are wide differences in practice. In the northern counties roots are generally sown on the ridge or raised drill, whereas in the south it is the universal practice to sow on the flat. Differences in climatic conditions control practice, and whilst there may be districts where there is difference of opinion as to what is best, at the two extremes the practice generally adopted is most suitable to the prevailing conditions.

Confining attention to sowing on the flat, it must be observed that there are differences in the methods employed; some farmers drill on a rolled surface, harrow behind the drill and again roll. This method is suited to the lighter soils that are not likely to harden on the surface; on the heavier soils, although it may result in good germination and early growth, the surface is apt to become so hard that horse hoeing and hand hoeing are done with great difficulty. On even medium soils the final rolling can be omitted without loss of efficiency or can be delayed until the young plants are coming through the soil. On heavy soils rolling may be done during the preparation of the tilth to ensure sufficient consolidation below, but should be avoided in the final operations before sowing, and should be done after sowing only when necessary to break a crust and then just as the seedlings are ready to come through the ground. There can, however, be no set rules: each soil must be handled in the way best suited to it according to the weather, and only experience and sound judgment at the time of any particular operation can decide whether it is right or not.

Grass Land.—The manner of grazing pastures has a material influence on the maintenance of their quality. This is particularly true with regard to the spring and early summer period. Close grazing in early summer tends to keep down coarse grasses and encourage the finer grasses and wild white clover. On the other hand, if grass is allowed to grow freely in early summer the stronger grasses tend to increase in vigour and dominate the finer grasses

and clover. Either extreme should be avoided. A pasture wholly composed of fine grasses and clover may be very palatable and highly nutritious, but the production per acre is not so high as when the herbage is more vigorous. The stronger grasses are usually highly productive, but except in their young condition they are less palatable, and unless they are closely fed down in their young condition they are less nutritious. The problem is to maintain a fair balance between the types of grasses, and the system of grazing is one of the most effective methods of control.

It is impossible to graze closely all the pastured area during the early summer months without unduly taxing the carrying capacity of the grass land for the rest of the summer. The laying up of a portion of the grass area for hay eases the situation, and if it is convenient to choose the fields so reserved, those with the higher proportion of finer grasses should be selected. The yield may be less than on fields with a higher proportion of strong grasses, but if the crop is cut at the right time the quality will be better and the proportion of strong grasses will be increased in the following year. If the field to be cut for hay already has a good proportion of strong grasses the grass should be cut early and the aftermath be closely grazed. The fields reserved for grazing should be treated according to their type; those carrying a high proportion of strong grasses should be fed well down from spring to mid-summer. By changing round in this way from year to year the whole grass area can be maintained with a reasonable blend of strong and fine grasses intermixed with clovers. The results are a fair compromise between quality and quantity.

During a period when close grazing is in operation it will often be noticed that certain spots are less palatable than others. This may be due to one or more of several causes. Horses are very uneven grazers and will closely eat off certain portions while leaving others almost untouched. The ungrazed portions get very coarse if left untreated, and the use of the mower can do much to prevent deterioration. In other instances the unpalatable portion may be due to wetness and sourness; the remedy is obvious—efficient drainage followed by a severe harrowing and a dressing of basic slag.

Unpalatable areas can also arise through the formation of a mat, and until this is broken up by harrow or cultivator

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little improvement can be expected. Subsequent to breaking the mat some form of phosphate should be applied, but all such operations should be carried out during the winter months.

In summer, mechanical treatment is mainly confined to topping grasses with the mower, and occasionally a light harrowing to spread the droppings of cattle.

More might be done with the roller on light grass land in summer. After heavy rains all pastures of a coarse type can be materially helped by heavy rolling, and this applies particularly to pastures on the lighter types of soils, especially where sheep are the only class of stock treading them.

NOTES ON MANURES

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Experiments on Mangolds.—It is generally believed that mangolds respond particularly well to farmyard manure, to quick-acting nitrogen, and to potash. The Barnfield experiments at Rothamsted certainly bring out these points, as far as the continuous growing of mangolds is concerned. They also show a considerable mutual effect of these manures, for their action when used alone is very different from their effect in combination. The following data averaged over 50 years of the Barnfield experiment brings out these points:—

Mangolds.	Tons per acre. Increase for		
		Nitrogen.	Potash.
No nitrogen, no potash	4.47	2.23	Nil
Sulphate of ammonia	6.70	—	6.80
Sulphate of potash	4.03	9.47	—
Sulphates of ammonia and potash	13.50	—	—

Each fertilizer is much more effective in the presence of the other than when used alone. In the presence of farmyard manure, which itself provides nitrogen and potash, these effects are considerably masked, but the manures continue to work in the same direction:—

	Mangolds. Tons per acre.		
	No potash or Superphosphate.	Potash and Superphosphate.	Increase due to Minerals.
Dung	17.47	18.94	1.47
Dung and Sul/Amm. ..	21.70	24.71	3.01
Increase due to Sul/Amm. ..	4.23	5.77	—

Few precise experiments have been conducted on mangolds to examine these effects under normal rotation crop-

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ping. At the suggestion of the writer a trial was conducted in 1932 by the Derbyshire County Council Agricultural Education Committee under the direction of Mr. G. E. Limb, on a field of mangolds at Oakerthorpe, Derby. The soil was a medium loam on the coal measures. Heavy dressings of artificials were used in order to secure strong responses. The dressings were rather greater than the standard adopted on Barnfield, Rothamsted, for yearly applications to the same area:—

Scale of dressings.

	Rothamsted.		Oakerthorpe.
Nitrogen	3½ cwt. S.A. 86 lb. N.	6 cwt. S/A.	138 lb. N.
Potash	4½ cwt. Sul/Pot., 240 lb. K ₂ O.	12 cwt. 20% potash salt, 269 lb. K ₂ O.	
Dung	14 tons.	15 tons.	

The experiment was designed to test the effects of nitrogen and of potash individually and together, both with and without dung. A good yield of mangolds was obtained, averaging 23.07 tons over the whole experiment, and ranging from 15.5 tons without manures, to 36.7 tons with dung and both artificials—an increase of 21.2 tons.

The average yields of the separate treatments were as follows:—

		Tons per acre.
		No dung. With dung.
No nitrogen, no potash	.. .. .	15.5 25.8
Sulphate of ammonia	.. .. .	24.4 31.5
Potash salt	.. .. .	18.9 30.8
Sul/Amm. and potash salt	.. .. .	33.5 36.7

Very considerable responses were obtained in this experiment to the fertilizer treatments, and the chief interest lies in examining how the presence of one manure affects the action of another. To state, for example, that the overall or average effect of 15 tons of dung was to increase the crop by 8.1 tons per acre, while sulphate of ammonia increased it by 8.8 tons, and potash salt gave a gain of 5.6 tons, by no means gives an adequate picture of the results.

The dung effect was widely different in the various circumstances of the experiment.

Increase of crop produced by Farmyard Manure.

Used alone	.. .. .	10.3 tons.
In presence of sulphate of ammonia	.. .. .	7.1 "
" " potash salt	.. .. .	11.9 "
" " both S/A and pot. salt	.. .. .	3.2 "

When both nitrogen and potash were supplied as artificials the effect of the dung was much reduced; elsewhere it was very pronounced. There was also, as at Rothamsted, a

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marked interaction of sulphate of ammonia with potash, especially in the absence of farmyard manure. This may be stated as follows:—

Increase in roots above the basal level (tons per acre).		
	No dung.	With dung.
For sulphate of ammonia alone	8.9	5.7
„ potash salt alone	3.4	5.0
„ sulphate of ammonia and potash salt	18.0	10.9

The sum of the individual increases due to nitrogen and potash is 12.3 tons, whereas the observed increase due to the two fertilizers is no less than 18 tons. Although this experiment was conducted for one year only, it gives results in general agreement with the classical experiment at Rothamsted. The great responsiveness of mangolds to nitrogen and to potash and to farmyard manure comes out clearly. The figures may be summarized thus:—

Increase due to:—		Roots. Cwt. per acre.	
		Rothamsted.	Oakerthorpe.
1 cwt. Sul/Amm in presence of potash ..	51		49
1 cwt. „ „ „ „ dung and			
potash	32		20
1 cwt. 20% potash salt, or 22 lb. K_2O in			
presence of nitrogen	12		15
1 cwt. 20% potash salt, or 22 lb. K_2O in			
presence of dung and nitrogen ..	6		9
1 ton of dung used alone	20		14
1 ton „ in presence of nitrogen and			
potash	15		4
1 cwt. nitrogen-potash mixture	25		20
1 cwt. „ „ „ in presence			
of dung	18		12

At Oakerthorpe 1 cwt. of artificials of the value of 5s. has given an extra ton of roots; on the showing of this experiment about 28 cwt. of dung would have been necessary to do this. Whether the residual effect of the dung is sufficient to compensate for its lesser immediate action is not easy to determine experimentally. The relative effectiveness of dung and artificials in this season comes out in another way. In presence of the two artificials dung could only increase the crop by 3.2 tons per acre, while in presence of dung nitrogen and potash in combination increased the crop by no less than 10.9 tons per acre.

The experiment shows that in a favourable season good crops of mangolds may be grown if generous dressings of nitrogen and potash are given, and that there is a strong mutual effect of these fertilizers. If dung is used there is still need for further nitrogen and potash, but it is probable that much lighter dressings than those actually used would

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then be more economic. Used alone the heavy dressings have justified themselves.

Top-dressing Wheat.—It is not yet too late to apply a nitrogenous top-dressing to wheat that looks as if it needs a little help. Experiments at Rothamsted and elsewhere have shown that top-dressings applied somewhat later than usual have given quite good results. As a rule they give a rather smaller increase in straw than the early dressings, but this is no disadvantage. Applied at this time of year when the land is warming up, sulphate of ammonia is quite rapid in its action provided that there is enough moisture to carry it into the soil. In dry districts, however, there is a case for giving a part or the whole of the nitrogen in the form of nitrate. Nitrochalk, nitrate of soda, or nitrate of lime may therefore be used in these circumstances. One hundredweight of sulphate of ammonia, or $1\frac{1}{2}$ cwt. of the nitrate is the usual dressing per acre, and 2 cwt. or more of grain would be a reasonable increase in yield to expect.

Peruvian Guano.—This fertilizer was one of the earliest concentrated manures to be used by British farmers. The early literature contains many favourable references to it. The successful use of Peruvian Guano in the middle of the nineteenth century undoubtedly prepared the field for the mineral artificials which were ultimately to displace it. Its good results are due to the fact that it contains a series of nitrogenous and phosphatic compounds of different degrees of availability, and a small but useful amount of potash. The more resistant part of the nitrogen and the residues of the mineral constituents are believed to give it a certain lasting effect, a point in a fertilizer which always appeals to farmers. This effect has been tested at Rothamsted on the Little Hoos Field over a long period of years, but in these trials the major action was undoubtedly in the year of application. Thus when 7 cwt. of guano was applied to the first crop and the residual action was looked for in subsequent crops the following values were obtained when the unmanured land is taken as 100:—

	1st year effect.	2nd year effect.
Mean of 7 years of cereals	158	100
Mean of 4 years of root crops	137	90

It appears therefore that guano is perhaps a more rapidly acting fertilizer than is sometimes believed. Most of its residual action will be associated with the phosphates rather

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than with the nitrogen. In a recent experiment on brussels sprouts, Peruvian guano was as effective in the first season as an equivalent mixture of ordinary artificials including sulphate of ammonia.

The increasing use of mineral fertilizers, owing to the lower unit prices of nitrogen in the inorganic salts, has left guano largely to the horticulturist, market gardener, and grower of high-value crops where quality is the main consideration. A certain amount finds a place in mixed

PRICES OF ARTIFICIAL MANURES

Description	Average price per ton during week ended March 8				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	8 16d	8 16d	8 16d	8 16d	11 4
„ „ Granulated (N. 16%) ..	8 16d	8 16d	8 16d	8 16d	11 0
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia:—					
Neutral (N. 20.6%) ..	6 10d	6 10d	6 10d	6 10d	6 4
Calcium cyanamide (N. 20.6%)	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 10	3 5	3 2	3 7g	4 9
Potash salts (Pot. 30%) ..	5 13	5 10	5 7	5 11g	3 8
„ „ (Pot. 20%) ..	4 1	3 17	3 14	3 19g	3 11
Muriate of potash (Pot. 50%)	10 9	10 2	9 15	10 5g	4 1
Sulphate „ „ (Pot. 48%)	12 5	12 0	11 15	12 3g	5 1
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%)||	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%)	3 2	..	3 4	2 16k	3 6
„ „ (S.P.A. 13½%)	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	6 10	6 5	6 7f	6 7	..
Steamed bone-flour (N. 3½%, P.A. 27½-29½%) ..	5 15	5 2	5 2f	5 0	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 85% through standard sieve.

a Prices for 4-ton lots f.o.r.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, and for lots of 10 cwt. and under 1 ton 15s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

fertilizers, for guano improves their condition and provides a valuable source of nitrogen and phosphate.

The place, origin, age, and degree of exposure to the weather all affect the nature and the grade of guano, so that the analysis is an indispensable guide to buyers. The grade has tended to decline as the deposits have been exploited, but there are still some good grade samples offered, containing up to 14 per cent. nitrogen, 10 per cent. phosphoric acid and 2.7 per cent. potash. In poorer samples the nitrogen may fall to 5 per cent. with a corresponding increase in the phosphate content. Of the various constituents the nitrogen is the most important and should be considered in relation to the cost of nitrogen in other high-grade organic manures (hoof and horn, dried blood, fish meal, etc.). For ordinary farm crops the price of inorganic nitrogen would be a more suitable standard of comparison.

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Early Summer Grazing: Supplementary Feeding.—With the approach of the grazing season, progressive graziers are anxiously considering how best to stock their pastures, and a difficulty arises as regards the strongest classes of grass land. As previously stated in these Notes, it has been considered necessary to have old bullocks for grazing such land because younger animals are held to be unable to withstand the scouring effect of the strong grass, particularly in the early part of the grazing season. In respect of certain pastures, there appears to be fairly strong evidence that this is correct, yet one may venture to believe that it does not apply equally to all the stronger grass land which has this reputation.

Certain reasons why young, or two-year-old cattle, fail to thrive on strong grass land are still obscure, but reasons have been advanced from time to time which account, to some extent, if not wholly, for the occurrence of more or less severe scouring. It has been shown that fresh, young grass in spring and early summer is of a laxative nature, and is high in protein in relation to starch. The composition of such grass has been compared to that of linseed cake, which has a nutritive ratio of 1:2. Such a ratio is narrow

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for all classes of cattle, but reasonably mature animals can stand a ration of this sort without harm, at least for a time. It has been explained, also, that the protein is partly in amide form, and amides are considered to have a scouring tendency. Moreover, there is a high proportion of water to dry matter and, in addition, there is some evidence that the mineral balance may be unsuitable. The information in regard to minerals is, however, by no means exact, but it has been reported that pastures which have been treated with basic slag, so that the herbage is relatively rich in calcium and phosphate, have proved less likely to cause scouring in younger cattle. Pastures recently laid down, including many of those which have been seeded since the war, though of high feeding value as measured by the live-weight increase of stock feeding on them, can generally be grazed with two-year-old stock without the animals suffering harm from scouring. Salt licks placed in the field have some reputation of having lessened scouring in young grazing stock.

In view of the known composition of young grass, as regards protein, artificial foods supplied to correct the balance should be low in protein and high in carbohydrates. Such foods should be of an astringent or binding character, and in this connexion a certain amount of fibre may be beneficial. Sellers of compound foods, however, who have attempted to supply a grass cake or cube of this composition, have met with some discouragement, as farmers, accustomed to value a compound food on its high percentage of protein and oil, and low fibre content, are inclined to look with suspicion upon a food low in protein and oil, and relatively higher in fibre. Nevertheless, a food of the latter description may be more suitable for grass feeding than one with an analysis of the type esteemed for winter use. The requirements for indoor winter feeding and outdoor summer feeding are different, and this is a point which needs to be made clearer to farmers concerned.

Attempts have been made to correct scouring by feeding a starchy food alone. Starchy meals are inconvenient to handle where large numbers of cattle are involved; cubes or nuts are much more useful. Treacle is, however, generally a necessary ingredient of a cube or nut, but the quantity of treacle used in a grass cube should be reduced

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to the minimum necessary to get the ingredients to "stick." Oil, in so far as it tends to encourage laxativeness, is undesirable. The relatively high percentage of oil has sometimes been a difficulty in respect of maize-germ meal, or maize-germ cubes, and rice meal. The cube made of maize meal is better in this respect, but is hardly sufficiently binding in itself and, so far as experience goes, best results have been obtained with a combination of cotton cake and maize meal or maize cubes. The natural astringent properties of undecorticated cotton cake are, unquestionably, valuable in correcting scouring, but a better balance is obtained, and the rate of progress is apparently better, when a starchy food is employed in conjunction with cotton cake, in preference to using cotton cake alone.

Much of the success in grazing young cattle on strong grass is due to management. On a certain farm in this county, the farmer used to graze $3\frac{1}{2}$ - to 4-year-old bullocks. He realized that strong bullocks were likely to continue to be relatively dear as stores in spring, and in poor demand and at lower prices per cwt. when fat in the autumn, consequently he decided to rear stores on another of his farms, and to attempt to graze them on his stronger land. In the autumn, he bought Irish weaned calves. They were wintered in partly-covered, partly-open yards, grazed the following summer on second class grass land, wintered again the next winter in yards, being given roots, straw, a little hay, and an allowance of 2 to 3 lb. coconut cake per head per day. In the spring, they were gradually drafted on to the strong grass. By "gradually" is meant that, in the second half of April, they were allowed to graze for a few hours a day, but brought in overnight. The coconut cake was replaced with the more binding cotton cake fed along with crushed oats. Those foods, together with a little hay, were continued at the rate of about 2 lb. per head, fed in early morning until the cattle were well accustomed to the grass. The change over from winter to summer feeding conditions covered about three weeks, and although it required more care than simply buying old bullocks and turning them out on the strong grass, the net result has made it possible to change over from old beasts of $3\frac{1}{2}$ to 4 years, to cattle of a little more than 2 years old, for which there is a better demand when it comes to selling them fat. The inclusion of minerals, such as ground chalk and iodized

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salt, is to be recommended in concentrated mixtures for use on grass; the quantity of chalk being adjusted to allow at least $\frac{1}{2}$ oz. per head per day. Chalk has some binding effect as well as other valuable properties.

It should be recognized that the making of profit out of grazing depends both upon the buying price, or cost of

Farm Values—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	5 4
Maize	78	7.6	4 12
Decorticated ground-nut cake	73	41.3	7 17
" cotton cake ..	68	34.7	7 10

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.27 shillings, and per unit protein equivalent, 1.95 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1932, issue of the Ministry's JOURNAL, p. 781.)

FARM VALUES.

CROPS	Starch equivalent	Protein equivalent	Food value per ton, on farm £ s.
	Per cent.	Per cent.	
Wheat	72	9.6	5 10
Oats	60	7.6	4 11
Barley	71	6.2	5 2
Potatoes	18	0.8	1 4
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 10
Beans	66	19.7	6 2
Good meadow hay	37	4.6	2 16
Good oat straw	20	0.9	1 7
Good clover hay	38	7.0	3 2
Vetch and oat silage	13	1.6	1 0
Barley straw	23	0.7	1 11
Wheat straw	13	0.1	0 17
Bean straw	23	1.7	1 13

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
Wheat, British	£ s. 5 8	£ s. 0 10	£ s. 4 18	72	s. d. 1 4	d. 0.71	% 9.6
Barley, British feeding ..	5 5	0 8	4 17	71	1 4	0.71	6.2
„ Canadian No. 3 Western ..	5 10	0 8	5 2	71	1 5	0.76	6.2
„ Argentine	5 8	0 8	5 0	71	1 5	0.76	6.2
„ Danubian	5 2½	0 8	4 14	71	1 4	0.71	6.2
„ Persian	5 0*	0 8	4 12	71	1 4	0.71	6.2
„ Russian	5 0*	0 8	4 12	71	1 4	0.71	6.2
Oats, English white	6 0	0 8	5 12	60	1 10	0.98	7.6
„ „ black and grey ..	6 0	0 8	5 12	60	1 10	0.98	7.6
„ Scotch white	6 13	0 8	6 5	60	2 1	1.12	7.6
„ Canadian No. 2 Western ..	6 5	0 8	5 17	60	1 11	1.03	7.6
„ „ No. 3	6 0	0 8	5 12	60	1 10	0.98	7.6
„ „ mixed feed	5 0	0 8	4 12	60	1 6	0.80	7.6
„ Argentine	5 5	0 8	4 17	60	1 7	0.85	7.6
„ Chilian white	7 13†	0 8	7 5	60	2 5	1.29	7.6
„ Danubian	4 17½	0 8	4 9	60	1 6	0.80	7.6
Maize, Argentine	4 18	0 8	4 10	78	1 2	0.62	7.6
„ Gal. Fox.	4 10†	0 8	4 2	78	1 1	0.58	7.6
„ Russian	4 8†	0 8	4 0	78	1 0	0.54	7.6
Beans, English winter	5 10½	0 19	4 11	66	1 5	0.76	19.7
Peas, Japanese	28 10†	0 17	27 13	69	8 0	4.29	18.1
Dari	7 5†	0 9	6 16	74	1 10	0.98	7.2
Milling offals—							
Bran, British	5 12	0 19	4 13	43	2 2	1.16	9.9
„ broad	6 12	0 19	5 13	43	2 8	1.43	10
Middlings, fine imported ..	5 2	0 14	4 8	69	1 3	0.67	12.1
„ coarse British	5 5	0 14	4 11	56	1 8	0.89	10.7
Pollards, imported	4 15	0 18	3 17	62	1 3	0.67	11
Meal, barley	7 5	0 8	6 17	71	1 11	1.03	6.2
„ „ grade II	6 10	0 8	6 2	71	1 9	0.94	6.2
„ „ maize	5 12	0 8	5 4	78	1 4	0.71	7.6
„ „ South African	5 5	0 8	4 17	78	1 3	0.67	7.6
„ „ germ	5 17	0 13	5 4	79	1 4	0.71	8.5
„ „ locust bean	6 12	0 6	6 6	71	1 9	0.94	3.6
„ „ bean	8 0	0 19	7 1	66	2 2	1.16	19.7
„ „ fish	14 10	2 13	11 17	59	4 0	2.14	53
Maize, cooked flaked	6 7	0 8	5 19	84	1 5	0.76	9.2
Linseed cake, English, 12% oil ..	8 15	1 3	7 12	74	2 1	1.12	24.6
„ „ „ 9% „	8 10	1 3	7 7	74	2 0	1.07	24.6
„ „ „ 8% „	8 5	1 3	7 2	74	1 11	1.03	24.6
„ „ „ 6% „	8 12½	1 3	7 9	74	2 0	1.07	24.6
Soya bean cake, 5½% oil	7 17½	1 12	6 5	69	1 10	0.98	36.9
Cottonseed cake—							
English, 4½% oil	5 17	1 3	4 14	42	2 3	1.20	17.3
„ „ Egyptian, 4½% „ ..	5 12	1 3	4 9	42	2 1	1.12	17.3
„ „ decorticated 7% „ ..	7 10†	1 13	5 17	68	1 9	0.94	34.6
„ „ meal, decorticated 7% „	7 10†	1 13	5 17	68	1 9	0.94	34.6
Coconut cake, 6% oil	6 10†	1 0	5 10	77	1 5	0.76	16.4
Ground nut cake, 6.7% oil	7 15†	1 1	6 14	57	2 4	1.25	27.3
„ „ „ decorticated, 6.7% oil	7 17	1 11	6 6	73	1 9	0.94	41.3
Palm-kernel cake, 4½-5½% oil ..	6 5†	0 13	5 12	73	1 6	0.80	16.9
„ „ „ meal, 4½% oil	6 5†	0 13	5 12	73	1 6	0.80	16.9
„ „ „ meal, 1.2% oil	5 12	0 14	4 18	71	1 5	0.76	16.5
Feeding treacle	5 0	0 9	4 11	51	1 9	0.94	2.7
Brewers' grains, dried ale	6 2	0 14	5 8	48	2 3	1.20	12.5
„ „ „ porter	5 12	0 14	4 18	48	2 1	1.12	12.5
Dried sugar beet pulp (a)	5 10	0 7	5 3	66	1 7	0.85	5.2

* At Bristol. † At Liverpool. § At Hull. (a) Carriage paid in 4 ton lots.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of February, 1932, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 22s. per ton as shown above, the food value per ton is £18 18s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.29d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From

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rearing of the store beast, and the selling price. Provided that stores can be bought cheap enough, a profit can be made even if the selling price is low. Certain graziers on the stronger class of land have found it more profitable to buy and graze barren cows than bullocks. The store price of the cows is low, although the casualty rate, more especially from summer mastitis, is admittedly high. The prices per cwt. at which the fat cows can be sold, are generally on a low level, but may be high enough to allow a margin for profit, if the store price is favourable. We look forward to a higher price for the best British beef, that is superior to the imported article; and, when improved prices come, those graziers who have been compelled, by force of economic circumstances, to embark on the grazing of barren cows, will be glad to transfer their efforts to the production of first-class beef. It is, however, purely a matter of economics, and the grazier has been forced to try whatever line appeared most likely to leave a margin of profit.

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Advisory Leaflets

SINCE the date of the list published in the November, 1932, issue of this JOURNAL (p. 784), the undermentioned Advisory Leaflets have been issued by the Ministry:—

- No. 143. Mutual Insurance of Live Stock—General.
- No. 144. Mutual Insurance of Live Stock—Cow and Pig Clubs.
- No. 146. The Valuation of Artificial Manures.
- No. 147. Phosphatic Fertilizers.
- No. 149. General Live Stock Insurance.
- No. 150. Millepedes and Centipedes.
- No. 151. The Cultivation of Parsnips.
- No. 152. The Culture of Green Peas and Beans.
- No. 153. Mange in Cattle.
- No. 154. Fruit Tree Capsids.
- No. 155. Brown Rot of Apples.
- No. 156. Cheddar Cheese.
- No. 157. Mustard Beetles.
- No. 158. Storing of Mangolds and Turnips.

Single copies of any of the above-mentioned leaflets may be obtained free of charge on application to the Ministry. Copies can also be purchased from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or at the Sale Offices of that Department at Edinburgh, Manchester, Cardiff and Belfast, price 1*d.* each net (1½*d.* post free), or 9*d.* net per dozen (10*d.* post free).

A selected list of the Ministry's publications, including leaflets, on agriculture and horticulture, can be obtained free and post free on application to the Ministry.

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Export of Breeding Stock

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during the three months ended December, 1932, compared with the corresponding period of 1931. (From returns supplied by H.M. Customs and Excise).

	Oct. to Dec., 1932		Oct. to Dec., 1931	
	Number	Declared value	Number	Declared value
CATTLE				
Argentina	3	£ 260	19	£ 3,905
Russia	0	0	204	8,058
Sweden	7	370	0	0
Australia	29	2,865	18	1,691
British India	17	993	1	11
Canada	35	1,840	48	2,460
Hong Kong	0	0	30	1,200
Irish Free State	16	671	377	5,434
Kenya	13	816	14	813
Union of South Africa	29	1,803	31	1,990
Other countries	15	1,272	14	454
Total	164	10,890	756	26,016
SHEEP AND LAMBS				
Argentina	161	1,420	106	2,535
Brazil	5	65	18	894
Chile	2	40	25	727
France	33	189	20	160
Morocco	25	125	0	0
Uruguay	42	316	29	650
Canada	10	309	9	135
Falkland Islands	4	320	0	0
Irish Free State	127	821	307	1,745
Union of South Africa	42	297	9	130
Other countries	31	399	23	313
Total	482	4,301	546	7,289
SWINE				
France	2	45	7	77
Japan	0	0	1	135
Lithuania	0	0	51	600
Poland	3	37	5	70
Russia	0	0	228	4,226
Switzerland	3	75	0	0
Australia	2	95	0	0
British India	2	34	2	36
Union of South Africa	4	173	1	25
Other countries	6	54	19	417
Total	22	513	294	5,586

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Export of Breeding Stock in 1932

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during 1932 with comparative figures for 1931. (From the "Annual Statement of Trade" and returns supplied by H.M. Customs and Excise.)

	1932		1931	
	Number	Declared Value	Number	Declared Value
CATTLE		£		£
Argentina	92	12,215	159	27,821
Belgium	14	538	76	1,918
Italy	0	0	48	2,600
Russia	353	13,388	657	29,508
Uruguay	12	1,190	28	2,715
Australia	41	6,795	50	4,706
British India	18	1,013	19	1,251
Canada	112	6,486	76	5,260
Irish Free State	530	12,771	1,644	33,807
Kenya	34	2,105	24	1,334
Union of South Africa	70	6,314	65	4,798
Other countries	69	3,330	90	4,701
Total	1,345	66,145	2,936	120,419
SHEEP AND LAMBS				
Argentina	247	3,065	187	4,565
Brazil	13	247	24	1,304
France	148	1,194	69	773
Paraguay	31	465	0	0
Uruguay	59	551	29	650
Australia	13	788	42	1,027
Canada	24	549	20	245
Irish Free State	250	1,239	442	2,437
Tanganyika	33	368	0	0
Union of South Africa	45	315	138	1,375
Other countries	154	1,407	143	2,110
Total	1,017	10,188	1,094	14,486
SWINE				
France	11	156	53	865
Italy... ..	31	155	49	620
Japan	2	100	14	888
Poland	14	142	195	3,650
Russia	0	0	228	4,226
Yugoslavia	0	0	130	2,821
Irish Free State	427	2,043	23	449
Union of South Africa	13	335	5	128
Other countries	40	749	136	2,517
Total	538	3,680	833	16,164

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The Agricultural Index Number

THE February index number for agricultural produce was 106 as compared with 107 in the previous month and 117 in February, 1932. The fall on the month of one point was due almost entirely to the lower prices recorded for milk, potatoes and fat cattle. Fat sheep and pigs and eggs were dearer, although in the case of sheep and pigs the relative indices fell one point.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13=100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	—
April	151	146	137	123	117	—
May	154	144	134	122	115	—
June	153	140	131	123	111	—
July	145	141	134	121	106	—
August	144	152	135	121	105	—
September	144	152	142	120	104	—
October	139	142	129	113	100	—
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—Wheat averaged 5s. 3d. per cwt. in February or the same as in the previous month, but as a slight increase occurred in the base period, the index was one point lower at 71. A reduction of 3d. to an average of 6s. 9d. per cwt. in the case of barley caused the index for this cereal to fall 3 points to 84, while for oats, although these were 3d. dearer at 6s. per cwt., the index moved upwards only one point to 85, as an almost similar rise in price was recorded in February, 1911-13. As compared with a year ago, wheat was cheaper by 5d. per cwt., while barley averaged 1s. 5d. and oats 1s. 3d. per cwt. less.

Livestock.—A reduction of 8d. to 36s. 9d. per live cwt. occurred in the average for fat cattle and in consequence the index was 3 points lower on the month. The quotation for fat sheep, however, was $\frac{1}{2}$ d. per lb. higher but as this rise was proportionately smaller than that in the base period, the index declined by one point to 106. Bacon and pork pigs also were dearer, the former by 2d. and the latter by 3d. per score but, for the same reason as for fat sheep, the relative indices were one point lower at 98 and 109. Similarly with store pigs, although the average per head was 1s. higher on the month, the index depreciated 4 points to 117. The fall of 2 points in the index for dairy cows, however, was occasioned by the decline of 9s. per head in

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the average price. Store cattle remained unaltered in value on the month and the index of 107 was repeated.

Dairy and Poultry Produce.—The average price for milk delivered under contract during the month under review was $\frac{1}{2}d.$ per gallon lower and the index of 150 compares with a figure of 155 a month earlier. Cheese also was cheaper at 13 per cent. above the base period as compared with 19 per cent. above in January. Butter, however, was 3 per cent. dearer at precisely the pre-war level. A substantial increase of 23 points occurred in the index for eggs owing to the fact that the average price rose on the month by 1s. 3d. per 120, whereas normally values fall during February. As regards poultry, fowls and ducks realised rather more and the combined index was one point higher at 122.

Other Commodities.—Potatoes were about 2s. per ton cheaper during February and the index of 113 was 3 points below that for January. Both meadow and clover hay remained steady and the index for hay was unaltered at 65. Except for cauliflowers and onions, vegetables sold at higher prices and the combined average was 6 points above the January index at 131. A slight fall in the value of wool caused the index for this commodity to decline one point to 63.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity.	1931.	1932.			1933.	
	Feb.	Feb.	Nov.	Dec.	Jan.	Feb.
Wheat	69	76	72	72	72	71
Barley	103	101	86	84	87	84
Oats	82	102	85	81	84	85
Fat cattle...	125	119	101	101	110	107
„ sheep...	137	100	87	91	107	106
Bacon pigs ...	131	95	85	92	99	98
Pork „	151	106	92	103	110	109
Dairy cows ...	132	121	117	114	113	111
Store cattle ...	129	123	97	103	107	107
„ sheep	135	96	70	72	83	82
„ pigs	198	114	95	108	121	117
Eggs	117	102	112	92	94	117
Poultry	144	123	121	115	121	122
Milk	162	146	152	155	155	150
Butter	116	107	97	98	97	100
Cheese	119	132	115	114	119	113
Potatoes	173	275	123	120	116	113
Hay	90	72	67	67	65	65
Wool	75	78	62	62	64	63

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Plant Pathology at Rothamsted

THE Management Committee of the Rothamsted Experimental Station decided recently to reorganize the old Department of Mycology started, in 1918, under the charge of Dr. W. B. Brierley (now Professor of Agricultural Botany at Reading University) and to constitute it a Department of Plant Pathology with Dr. J. Henderson Smith as Head.

The new Departmental Head studied medicine at Balliol College, Oxford, afterwards proceeding to Edinburgh, where he took his medical degree. He was then awarded the Philip Walker Studentship in Pathology, which he held at Oxford until his appointment, first as Bacteriologist at the Lister Institute, and, afterwards, as Plant Pathologist in the Mycology Department at Rothamsted. Dr. Henderson Smith has published numerous papers on animal pathology, especially immunity and bacteriology; and on plant pathology, especially virus diseases, a subject in which he has achieved distinction.

* * * * *

Farm Workers' Minimum Rates of Wages.—A Meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on Monday, March 20, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Devonshire.—An Order fixing minimum and overtime rates of wages for male workers and minimum rates of wages for female workers to come into operation on March 26, 1933 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until March 24, 1934. The minimum rate in the case of male workers of 21 years of age and over is 31s. (instead of 32s. 6d. as at present) per week of 43 hours in the week in which Good Friday falls, 43 hours (instead of 52 hours as formerly) in the weeks in which Easter Monday and Whit Monday fall, 52 hours in any other week in summer, 32 hours in the week in which Christmas Day and Boxing Day fall and 50 hours in any other week in winter, with overtime throughout the period at 8d. per hour on weekdays and 9½d. per hour on Sundays, and for all overtime employment on the hay and corn harvests (instead of 8½d. and 10d. per hour respectively as at present). The minimum rate in the case of female workers of 20 years of age and over remains unchanged at 5d. per hour for all time worked.

Durham.—An Order fixing minimum and overtime rates of wages to come into force on May 14, 1933 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until May 13, 1934. The minimum rates in the case of male workers of 21 years of age and over are: for horsemen who are householders, 31s. (instead of 32s. as at present) per week of 50 hours, with in addition 7s. per week to cover all time spent in attention to horses; for horsemen who are not house-

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holders, 30s. (instead of 31s. as at present) per week of 50 hours with in addition 3s. 6d. per week to cover all time spent in attention to horses; for horsemen who are boarded and lodged by their employers, 30s. (instead of 31s. as at present) per week of 50 hours and all time spent in attention to horses; for stockmen and shepherds per week of the hours customarily spent in attention to stock, householders 42s. (instead of 43s. per week as at present); non-householders, 35s. 11d. (instead of 36s. 10½d. as at present); workers boarded and lodged 34s. (instead of 35s. as at present); and for other male workers, 29s. (instead of 31s. as at present) per week of 50 hours. For casual workers the rate is unchanged at 6d. per hour. The overtime rate in the case of all classes of male workers of 21 years of age and over, other than casual workers, is unchanged at 8d. per hour except for overtime employment on Saturday afternoon, Sunday, Christmas Day and Good Friday, when it is unchanged at 9d. per hour. The minimum rates for female workers of 18 years of age and over are unchanged at 2s. 6d. per day of 8 hours with overtime at 4d. per hour.

Herefordshire.—An Order fixing minimum and overtime rates of wages to come into force on May 1, 1933 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until April 30, 1934. The minimum rates are: in the case of male workers of 21 years of age and over employed wholly or mainly as bailiffs, waggoners, stockmen or shepherds, 35s. (as at present) per week (including Sunday) for all time necessarily spent on the immediate care of animals (not exceeding 60 hours) with overtime unchanged at 8½d. per hour except for employment on Christmas Day and Good Friday, where a worker has completed less than 60 hours in the weeks in which those holidays fall, when the rate is 2d. per hour; and in the case of other male workers of 21 years of age and over, 30s. (as at present) per week of 39½ hours in the week in which Christmas Day falls, 48 hours in any other week in winter, 44½ hours in the week in which Good Friday falls, and 54 hours in any other week in summer, with overtime unchanged at 8½d. per hour. In the case of female workers of 18 years of age and over the minimum rate is 4½d. per hour with overtime at 6d. per hour except for employment on Christmas Day and Good Friday, where a whole-time worker has completed less than 46½ hours in the weeks in which those holidays fall, when the rate is 1½d. per hour.

Lancashire.—An Order fixing minimum and overtime rates of wages to come into operation on May 1, 1933 (i.e., the day following that on which the existing rates are due to expire) and to continue in force until April 30, 1934. The minimum rates in the case of male workers of 21 years of age and over are: in the Southern area, stockmen and teamsmen 35s. (instead of 37s. as at present) per week of 52½ hours; and other workers 32s. (instead of 33s. 6d. as at present) per week of 50 hours; and in the remainder of the area of the Committee, stockmen and teamsmen 38s. (instead of 40s. as at present) and other workers 35s. 6d. (instead of 37s. 6d. as at present) per week of 60 hours in each case. The overtime rate in the case of all classes of male workers of 21 years of age and over throughout the area of the Committee remains unchanged at 9d. per hour. In the case of female workers of 18 years of age and over the minimum rate remains unchanged at 6d. per hour for all time worked.

Oxfordshire.—An Order continuing the operation of the minimum and overtime rates of wages from April 2, 1933 (i.e., the day following that on which the existing rates are due to expire) until July 29, 1933. The minimum rates in the case of male workers of 21 years of age and over are 28s. per week of 41 hours

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in the weeks in which Good Friday, Easter Monday and Whit Monday fall and 50 hours in any other week with overtime throughout the period at 8*d.* per hour on weekdays and 10*d.* per hour on Sundays, Good Friday, Easter Monday and Whit Monday. The minimum rate for female workers of 18 years of age and over is 6*d.* per hour, with overtime at 7½*d.* per hour on weekdays and 9*d.* per hour on Sundays, Good Friday, Easter Monday and Whit Monday.

Radnor and Brecon.—An Order fixing minimum and overtime rates of wages to come into force on May 1, 1933 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until October 31, 1933. The minimum rates in the case of male workers of 21 years of age and over are unchanged at 29*s.* 6*d.* per week of 50 hours in winter and 54 hours in summer, with overtime unchanged at 9*d.* per hour. In the case of female workers of 18 years of age and over the minimum rate remains unchanged at 5*d.* per hour with overtime unchanged at 6½*d.* per hour on weekdays and 7½*d.* per hour on Sundays.

Enforcement of Minimum Rates of Wages.—During the month ending March 14, legal proceedings were taken against four employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
Lancashire ..	Warrington	£ s. d. 2 0 0	£ s. d. 18 0	£ s. d. 9 0 0	2
Lincoln :					
Holland ..	Boston ..	10 0	—	11 2 0	1
Yorks : W.R.	Barnsley ..	4 0 0	—	21 1 8	1
Merioneth & Montgomery	Llandysilio..	1 0 0	—	2 5 0	1
		7 10 0	18 0	43 8 8	5

Proceedings were taken at Bingham, Notts., against an employer under Section 9 (3) (c) for producing false documents and under Section 9 (3) (d) for giving false information. The former case was dismissed but in the latter a fine of £5 was imposed with £1 18*s.* 0*d.* costs.

* * * * *

Foot-and-Mouth Disease.—Since February 23, there have been twelve further cases of Foot-and-Mouth disease in Great Britain. These cases occurred in the counties of Buckingham, Derby, Glamorgan, Leicester and Warwick, and the movement of cattle, sheep, goats, pigs and deer around the various premises on which the disease was found to exist was prohibited by the Ministry in accordance with its usual practice.

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COUNTY AGRICULTURAL EDUCATION STAFFS. ENGLAND

Essex.—Miss J. T. Cock has been appointed Manager of Egg-laying Trials, *vice* Miss K. M. Phipps.

NOTICES OF BOOKS

Agricultural Russia and the Wheat Problem. By Vladimir P. Timoshenko. Pp. xi + 571. (London: P. S. King & Son, Ltd., for Stanford University, California, U.S.A. 1932. Price \$4.)

This is a book of considerable importance. To those who have asked what is likely to be Russia's future share in the development of world's wheat production and trade, Dr. Timoshenko has sought to give an authoritative answer. With this objective he has examined in detail the official agricultural statistics for pre-war as well as post-war Russia, the policy of the Soviet Government towards agriculture, the methods of cultivation, the geographical disposition of crops, the conditions that determine yield, and the domestic requirements of the Russian people.

In this important analysis, two chapters are of special value to the student of the Russian position: Chapter II dealing with "Land Utilization and the Outlook for Expansion of Crop Area," and Chapter IX entitled "Bread Grain Yields per Acre." In the former the author examines the limitations to an expansion of the crop area in the chief regions of European and Siberian Russia—limitations due to the capital expenditure (for deforestation, drainage, etc.) necessary to bring the new area under crops, to climatic conditions, and to conditions dependent upon the development of transport. He also examines the possibility of expansion of wheat on the existing cultivated area by a reduction in the proportion of fallow and by other adjustments in methods of cultivation. In Chapter IX he deals in detail with the yield per acre of various grains, and examines the possibilities of bringing about an increase in yield such as was projected under the Five Year Plan.

In the final chapter of the book, Dr. Timoshenko attempts to relate these factors to the problem of consumptive demand arising from the relatively rapid growth of the population, and clearly shows the formidable nature of the problem of raising and maintaining production at a level sufficient to provide for domestic needs alone. The possibility that in the next few years Russia may be able to return to her pre-war share in the world's exports of wheat is also shown to be a matter involving very great technical difficulties.

The rest of the book contains a valuable account of the agrarian Revolution of 1917-20 and of the development of the agricultural policy of the Soviet Government, as well as more technical chapters dealing with the characteristics of Russian wheat and the organization of transport, storage, etc.

A condensed version of this book was published in March and April, 1932, under the title of "Russia as a Producer and Exporter of Wheat," as Vol. VIII, Nos. 5 and 6, of "Wheat Studies" issued by the Food Research Institute, Stanford University, California.

The Corn Laws and Social England. By C. R. Fay. Pp. x + 223. (Cambridge: University Press. 1932. Price 10s. 6d.)

The purpose of this work is described in the preface: "Now that it has been decided once again to tax or restrict the nation's bread, it seems not inappropriate to pass in review the circumstances under which in former times such taxes and restrictions were imposed and then repealed." The particular aspect of the Corn Laws which is treated in this work is one that has, of course, been touched upon by earlier writers, but perhaps hardly in the same way as by Mr. Fay, although it is impossible in any consideration of the Corn Laws to avoid discussing the social results arising from them.

Mr. Fay's study is comparable with the extensive work recently published by Dr. Barnes under the title of "History of the English Corn Laws" and reviewed in this JOURNAL for October, 1930, but it places a great deal more emphasis upon the results of the Laws than

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Dr. Barnes did, since his work was more concerned with the legislative action and its development than with its consequences upon the people at large. The treatment which Mr. Fay has given the subject is, perhaps, more "human" than this method.

The points of similarity and dissimilarity between the mental attitude which dictated the earlier legislation and that which has recently resulted in the setting up of the Wheat Quota are to some extent emphasized.

There are, as is almost inevitable in a work of this kind, points upon which there can hardly be final agreement at this day, but it is not proposed to discuss these points here. It is, however, a little difficult to accept the statement made on page 38 that the response of British farming to the emergency (of the French wars) was so superb that the country could have survived without the importation of a single quarter of foreign wheat. An exhaustive study of "The Grain Supply of England during the Napoleonic Period" was published by Dr. W. Freeman Galpin in 1925 and a brief summary of the measures adopted at that earlier period and during the European war appeared in "Scientific Agriculture" (Canada) for May, 1932, under the title of "Grain Supply in Two Wars, the Napoleonic and the European." The statistics supplied by Dr. Galpin do not confirm Mr. Fay's conclusion. The student of the subject owes, however, a debt to Mr. Fay for his description of the corn trade around 1800, which is a careful study of the various aspects of the business, and for his vigorous and illuminating description of the controversy between the Corn Law League and its opponents; while his analysis of the economic theories underlying the legislative enactments will supply the average reader with a type of criticism of classical economics that is certainly requisite for the modern student.

A Bibliographical List of the Entire Domain of Agricultural Chemistry. Edited by Professor H. Niklas and Dr. A. Hock. Vol. I. Soil Science, pp. xxxvi + 1,008. Vol. II. Soil Analysis, pp. xxviii + 199. (Weihenstephan, by Munich: Verlag des Agrikulturchemischen Institutes. Price: Vol I, RM.40; Vol. II, RM.12.)

The realm of agricultural chemistry and the literature relating to it are so extensive that workers in all its branches will be grateful to the originators of these two volumes, and they will no doubt look forward to the publication of the four further volumes which have been planned: Volumes III and IV will deal with Plant Nutrition and Fertilization, Volume V with Agricultural Bacteriology, and Volume VI with Animal Nutrition and it is hoped that they will be published at intervals of about one year, so that the next volume may be expected shortly. It was first intended to issue only one volume dealing with the study of the soil, but since the subject "Soil Analysis" seemed to the editors to have developed into a separate science, and the volume dealing with Soil Science had already reached the large bulk of 1,000 pages, it was felt desirable to issue the section dealing with Soil Analysis as a separate volume.

The bibliography is arranged in a number of sections under the headings of "General Literature," "Formation of Soils," "Soil Chemistry," "Soil Physics," "Relations between Soil and Environment," "Classification and Mapping of Soils," and the "Soils of Different Countries," being completed by a section on the "Composition of Soils, Rocks, and Minerals." The volume on Soil Analysis covers the whole subject, and is arranged under convenient headings, which are too numerous to set out here but may be said to deal with the different soil components and with the various methods of effecting an analysis.

The use of these two volumes is self-evident, and it is unnecessary to expound the extent of their usefulness here.

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The Farmer's Guide to Agricultural Research in 1931. Pp. 204. (London: John Murray. 1932. Price 1s.)

This is the seventh in the series of annual publications issued by the Royal Agricultural Society of England containing a survey of the progress of agricultural research during the year. Previous issues have borne the title of *Agricultural Research*; the change in the title of the present volume is designed to emphasize the purpose of its publication, which is to present to farmers in a readable form a digest of research work in this and other countries during 1931. There are seven surveys of different aspects of agricultural research, the first being an interesting discussion on dairy farming and dairy work by Mr. J. Mackintosh of the National Institute for Research in Dairying, in which many problems of interest to the dairy farmer are discussed. Diseases of animals are treated by Dr. F. C. Minett, farm economics by Professor A. W. Ashby, the feeding of livestock by Dr. Crowther, farm implements by Mr. S. J. Wright, pests and parasites by Mr. J. C. F. Fryer, and soils and manures by Sir John Russell. Each of the articles is supported by a list of published papers relating to the subject matter discussed; this will be of value to those who desire to make further studies in these subjects. The annual is issued free to members of the Society, and the nominal charge made to non-members should ensure the wide circulation, desired by the Society, which this extremely useful piece of work undoubtedly deserves.

British and Irish Writers on Agriculture. Compiled by W. Frank Perkins. Second ed. Pp. xi + 193. (Lymington: C. T. King, High Street. 1932. Price 12s. 6d.)

A notice relating to the first edition of this bibliography was published in this JOURNAL for January, 1930, and it is good to know that a work of this type should have sold sufficiently well to justify the issue of another edition so soon. The new edition has been amplified by the addition of about 160 authors, together with two lists of anonymous books, some of which present very pretty problems in the detection of their authors, in spite of the encyclopædic work of Halkett and Laing on this subject. The book is arranged on exactly the same plan as the previous edition, and it forms the most comprehensive bibliography of agricultural works which has yet been published. As Mr. Perkins says in his introductory remarks, it is difficult to know where to draw a hard and fast line in excluding books that have an agricultural bearing but are not precisely agricultural books. The consequence is that there are one or two entries which do not, on the surface, seem to fall exactly within the latter category, but it is well in examining a work of this kind not to be too exacting, and Mr. Perkins must be complimented on the extension of his bibliography and the improvements that he has made in the new edition, the publication of which is a further step towards the completion of the subject.

Starting Egg-Farming, Eh? By J. S. Hicks. Pp. 43. Illustrated. (London: "The Feathered World." 1932. Price 10d.)

In view of the large number of people who imagine that it is possible to make an easy living from a few acres of land stocked with poultry, the information contained in this booklet should be of assistance. The importance of adequate preliminary training is emphasized, and a conservative estimate is given as to the profits that may be expected from a given capital expenditure. Both the semi-intensive and purely intensive systems are dealt with, together with useful notes on the stock-carrying capacity of the land. The second part deals with the general lay-out of a poultry farm, including a section on suitable sites and importance of good drainage. Plans are given to show how to ensure convenience in working a plant, while useful tables show the appropriate cost of housing poultry in different sized units. This booklet should be of value to those who contemplate investing their savings in poultry farming, and may save many disasters such as have occurred in the past.

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

Vol. XL No. 2 May, 1933

NOTES FOR THE MONTH

Use of the Small Hay-Sweep

THE following note has been communicated by Mr. J. S. Featherstone, Instructor in Manual Processes for Nottinghamshire:—

One of the difficulties of a wet season is to secure the hay crop in good condition; and, as is well-known, most of the damage occasioned by rain occurs when the hay is ready for carting and stacking. Such damage, in changeable weather, however, may sometimes be prevented by making use of the small hay-sweep or collector, which is employed to a considerable extent in the North of England, Scotland and Ireland. With this implement, hay can be collected and pyked at least one day earlier than would be advisable if carting it to stack; and, providing the crop is dry, it can be pyked in quite green condition, although it will take a little heat and make considerably if allowed to stand a few days. In a well-built "pyke" or "cob," however, the hay will be perfectly safe in any kind of weather and, if desired, it can remain in such formation for a prolonged period without ill results. Both light and heavy crops can be collected very quickly by the hay-sweep, for the tines of the implement, running under the hay and sweeping the whole of it together, save delay in clearing up. Anyone accustomed to pitching hay knows that the cleaning up of a light crop is more tedious than when working on a heavy crop which will hold together, but the hay-sweep will deal with either light or heavy, short or long hay crops in a very satisfactory and economical manner.

When it is intended to make use of the hay-sweep, it is important to pull the crop together with the horse rake, or turn it with the side-delivery rake into small, straight windrows. If the land is very uneven, care should be taken to place the windrows half-way between ridge and furrow, as this will give a sloping but level surface for the tines of the sweep to work upon. It is not reasonable to

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dispense with the horse rake or side-delivery rake and expect the sweep to clean up from the swathe.

In arranging the work, much depends upon the size of the farm and the gang employed. If only a one-horse rake is used, it is advisable to work it in "short bouts," so that a fair length of windrow can be obtained quickly, thus giving longer rows for the sweep to work upon and saving unnecessary turns. If two or more rakes are used, or a side-delivery rake, the length of row is quickly obtained, and "short bouts" are not then so essential.

The horse is "hitched" to the sweep by means of chains about 18 ft. long, or by two plough-traces joined together; either will give the required length and allow a large load of hay to be collected. The sweep is driven up either side of the windrow, crossing over if necessary to obtain a greater load. The operator drives the horse, lifting the sweep handles slightly in order to keep the tines well down on the swathe or stubble, thus preventing the points from foddering. If the implement does not run clean, the horse should be stopped and backed, the sweep drawn back a foot or so, and a fresh start made. With efficient working, it is possible to collect as much hay as a good horse can pull.

The dumping of a sweep-load is effected by backing the horse, drawing back the implement about a yard, and raising the handles to allow the tines to penetrate the ground; then, when the horse is moved forward, the sweep turns over, discharging its load and resetting itself in readiness for another load. Under favourable conditions, three or four sweep-loads are required for each pyke or cob; this makes about a one-horse-cart load, but if the land is uneven and the hay sweeps badly, six or eight sweep-loads may be required. It is advisable to collect hay for two cobs at the same time, one at either end of the particular area being cleared, thus saving empty journeys. In the actual building of the cob, it is not essential to move the central dump. This should be trampled down, the base rounded, and the remaining sweep-loads built-up upon it. One man or lad will do the building and trampling while the others—say two or three men—do the pitching. Care should be taken by the pitchers to place the forkfuls as near the correct position as possible, as this helps to speed up the work and enables the builder to keep the middle full—a very important point. When the building-up is com-

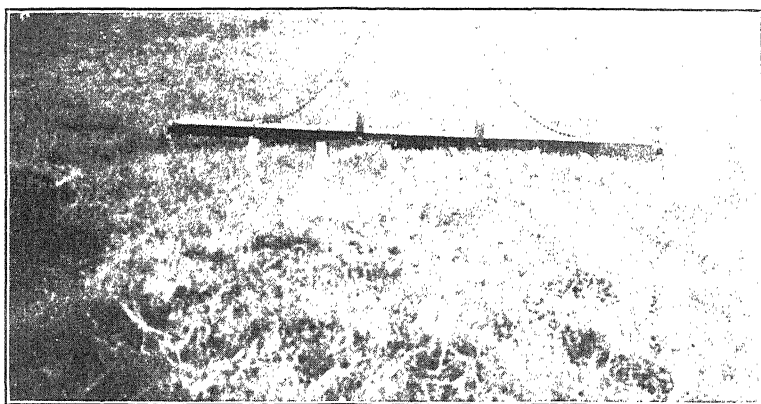


FIG. 1.—The small hay-sweep.

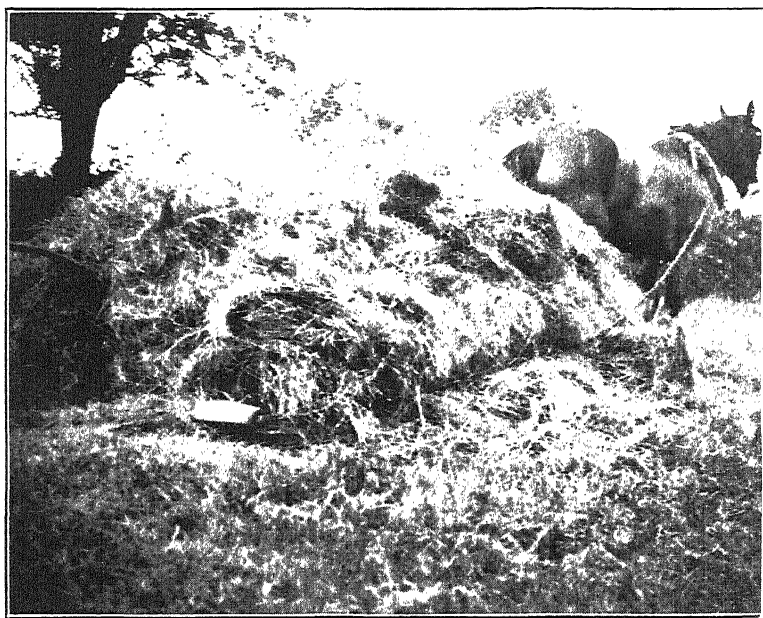


FIG. 2.—A hay-sweep loaded.

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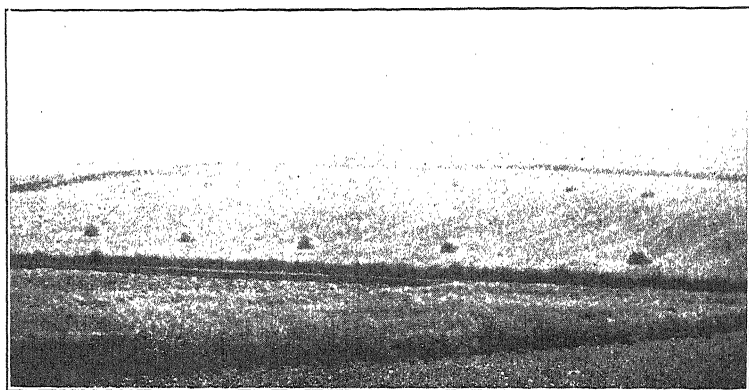


FIG. 3.—A field of hay in "cobs" or "pykes." Note the position of the windrows.



FIG. 4.—A well-built "cob" containing about a cart-load of hay. This cob stood for 5 weeks in the wet weather of 1931 and kept perfectly dry inside.

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pleted, the top should be rounded over to prevent rain from entering the cob, and it is good policy to rake down any loose hay from the sides and roof. A well-built cob will throw off any amount of rain.

Should the gang be large enough, the horse-rakes, after "pulling together" the main crop, may be started on the clearing-up of the "gatherings." These, if swept up and cobbled immediately should be as good as the main crop of hay.

In very unsettled weather, it is not advisable to pull more hay into windrows than can be speedily and conveniently handled by the gang, as hay will dry much more quickly in the swathe than in the windrow.

There are various methods of removing the pykes. In some districts special carts are used, having low flat bodies fitted at the front with a winch. By means of strong ropes or cables placed round their bases, the cobs or pykes are hauled up on the cart at the rear with the aid of the winch, one horse being sufficient to haul the cart under level conditions. The pykes may also be drawn direct to the stack by tractor or horses attached to logging chains or strong ropes placed round the bases of the pykes; alternatively, they may be loaded up on farm carts, wagons or drays in the usual way.

With a little care and forethought in the arrangements, there is no doubt that the use of the hay-sweep makes it possible, even in unsettled weather, to collect a large quantity of hay, and make it safe from the weather, more speedily than by most other methods. An additional point in favour of the implement is that it is inexpensive and thus within the reach of small farmers.

A Danish Type of Pig-House

CONSIDERABLE interest has been manifested by pig-keepers in the Scandinavian system of pig-raising, in which, for maintaining the animals in comfort, more dependence is placed upon the internal temperature of the house than upon feeding. Several types of Swedish piggeries are illustrated in the Ministry's Bulletin No. 32,* but a slightly different and less elaborate structure, devoted solely to the rearing of young pigs, is shown in the Danish example which has been translated into English dimensions and

* *Pig-keeping*. Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 1s. 6d., post free, 1s. 9d.

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traditional building methods in the accompanying drawing. As will be seen, this consists of a double row of eight pens, with a central feeding gangway leading from a fodder house. Each pen is furnished with a dunging compartment, as in the Swedish examples, and doors are so arranged that, when required, they can be closed off to form a cleaning gangway, which is also used for the entry or exit of the pigs. The partitions next to the feeding walk are uninterrupted by doors and have continuous feeding-troughs, with inclined grilles of horizontal tubing. The partitions next the dunging compartments are solid, but all the remaining divisions are of spaced slats or steel tubing.

The root idea of the house is controlled temperature. With this object, the windows or skylights are not made to open, fresh air being admitted solely through the entry to the hot-air stove placed in a separate compartment off the fodder room, from which it is stoked. Heated air is delivered by an aperture 4 ft. 6 in. above floor level and, after circulating over the pens, the air is drawn out near floor level, at the opposite end of the house, by an opening to an upcast flue terminating in a four-way louvred ventilator above the ridge. To meet summer conditions, an alternative outlet is provided by a ridge trunk having a butterfly valve controlled from beneath, and all doors can be opened, of course, for the admission of supplementary air.

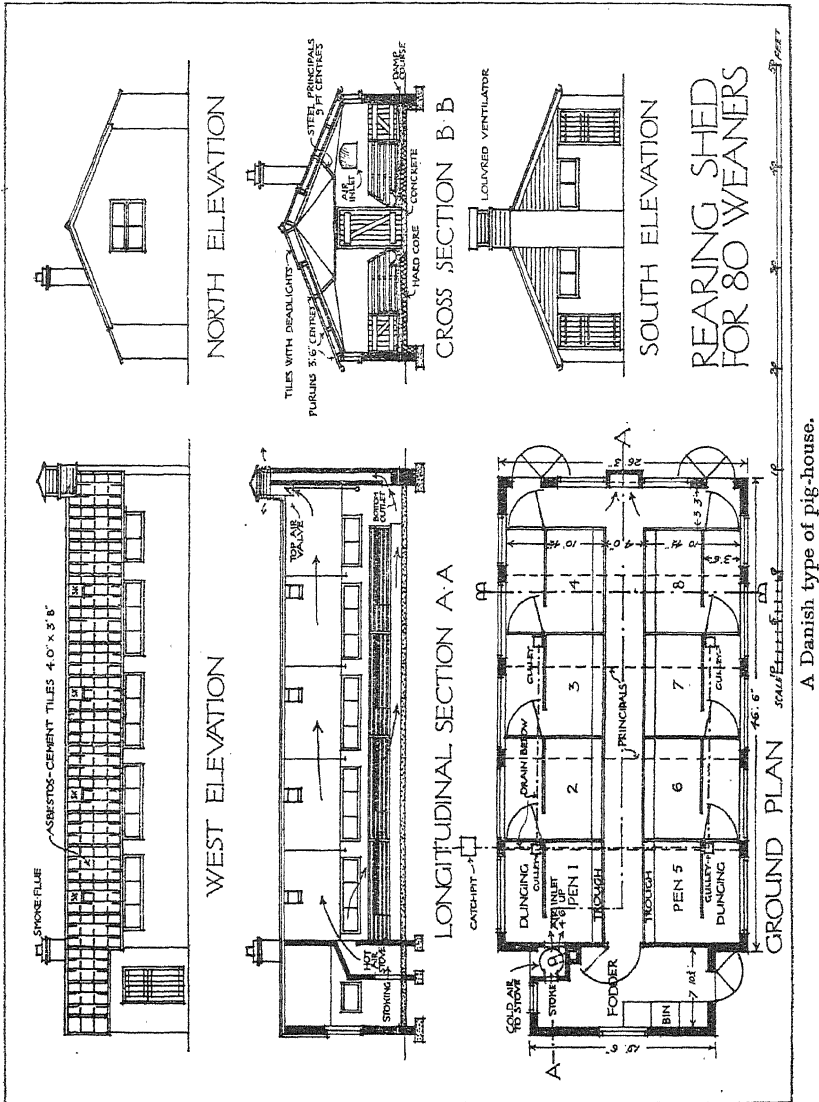
A loft is not formed, but it is essential that the roof should be lined with boarding, or with such materials as Insulwood or Tentest.

The cross-section of the pen floors shows a fall from the manger to the dunging passage at an inclination of 1 in 40, with a drop of about 2 in. to the passage and an inward fall towards this point of 1 in 20 across the gangway. Gulleys are provided at intervals to drain off the liquid from the channel so formed.

In the English version of the original, presented here, each pen is approximately 10 ft. by 7 ft. exclusive of dunging compartment, the centre gangway being 4 ft., the side gangways, 3 ft. 6 in., and the end cross-gangways, 3 ft. 3 in.

Walls and flues are shown of 9 in. brickwork, and floors of concrete which, it is suggested, should be laid upon a bed of coarse broken brick over the area occupied by the

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pig pens. The roof is without rafters, and is laid upon 4 light steel principals, which can be obtained from stock for about £3 each. Upon these run purlins, spaced 3 ft. 6 in. centres, to receive asbestos-cement tiles 4 ft. by 3 ft. 8 in. In using units of this type, it is important, for economy, to preserve a setting-out which will not necessitate cutting. Windows in side and end walls are wooden frames with cast-plate glass, and supplementary lighting is provided over each pair of pens by a pair of deadlights, which can be obtained as stock articles to work in with the asbestos-cement tiles. The soffit lining is nailed up to the roof purlins.

Several types of hot-air stoves are now obtainable in this country, being generally used for domestic heating. The installation work in connexion with this type of stove is comparatively simple. Four openings are required, viz., an external fresh-air opening, 2 ft. 6 in. wide by 1 ft. 6 in. high at floor level; a stoking aperture, to suit the size of the particular furnace, next the fodder room; a smoke inlet to the brick chimney to receive the iron smoke pipe; and the warmed-air outlet from the stove chamber to the piggery. The cost of such a building as illustrated ought to be in the neighbourhood of £350.

For fattening a similar number of pigs at the allowance of 10 per pen, it would perhaps be necessary to increase each pen from 10 ft. by 7 ft., as shown, to 10 ft. square, thus increasing the overall width of the building by 6 ft. The additional cost of so doing, bearing in mind that the more complicated items are not extended proportionately with the simple structure of end-walls, floor and roof, would probably amount to about £35.

The Official Seed Testing Station in the Year 1931-32

In the twelve months ended July 31, 1932, the Official Seed Testing Station tested 30,689 samples, or 696 more than the largest number tested in any previous season. The number of samples from outside sources for test was 27,699, which is 837 more than had previously been received. The number tested for investigation of special points was 2,990, about the average for a season. Just over half of these last were connected with loss of vitality in storage; cereals and clovers were the most numerous of the other kinds studied. In what proportions the increase of samples to a record level was due to the bad

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harvest of 1931, to the closing (in December, 1931) of the only other station in England and Wales licensed to test seeds for the public, and to a continued growth of satisfaction with the Station's services, is a matter for speculation, but it is certain that all three played their parts. The modifications of certain fees, introduced experimentally in August, 1931, were not sufficiently widely known in time to have much effect on the number of samples submitted or on the income from fees; they are, however, being continued for another twelve months.

Time has been found not only to carry out special tests as required to solve difficulties caused by seasonal conditions, but also to continue the regular investigations and to study new problems. It is often of importance in commerce to be able to identify the origin of imported cereals. The Station has, therefore, been paying a good deal of attention to the impurities found in cereals that come from such countries as Morocco and Algeria, and it has already been able to make practical use of the information so obtained. Identification has also been a difficulty hitherto in regard to the several species of *Bromus* that occur in grass and sainfoin seed, and of *Lychnis* in clover seed. These impurities have been studied in the laboratory and the field, the points of difference have been worked out, and private stations have been helped in the matter by the supply of information and specimens. The examination of barley and oat samples for the presence of *Helminthosporium* has been much extended during the past season, and the new cold-storage incubator has proved useful in this task. Many of the tests were made for the purpose of helping the Crop Improvement Branch to determine the effectiveness of Ceresan and Agrosan G in disinfecting cereal seed. One other investigation may be mentioned: the Station, in co-operation with the New Zealand Seed Testing Station, has begun to study the germination and moisture content of shipments of Chew-ing's Fescue seed in the hope of finding the reasons for and preventing the loss of germination power that is apt to occur during the sea voyage.

Conditions in 1932 were good for the harvesting of wild white clover seed, and it was hoped that many of the farmers whose fields have been recorded as eligible under the certification scheme would apply for certificates. Comparatively few, however, have yet done so; this is dis-

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appointing, for unless a good proportion obtain certificates it is impossible for farmers, generally, to reap the full benefit of the work that has been done under the scheme. Applications for fields to be examined continue to reach the Ministry, and, in 1932, the Station received and sowed samples from fifty fields. The Growing-On Committee met at Cambridge during the summer. The total number of these samples so far sown is 788. Some of the plots are still under consideration, but 538 fields, representing some 7,000 acres, have been passed as satisfactory in their respective grades.

World's Poultry Congress, 1933

PROBABLY few of those who are contemplating the journey to Rome next autumn possess a knowledge of Italian, while some may have had little experience of travel on the Continent. For the convenience of British visitors to the World's Poultry Congress special terms have been arranged, inclusive of railway fares, meals and booked seats on trains *en route* (except for third-class passengers), full board at good hotels, and all gratuities. To obtain these terms the intending visitor must become a Congress member by payment of 25s., this subscription entitling him or her to a distinctive badge, to receive all official documents, participate in meetings, and attend the Congress Exhibition and such official receptions and functions as may be organized in honour of the visitors. (The subscription for ladies accompanying members is 8s. 6d., which does not include Congress documents.) Members have a choice of the following tours:—

Tour 1.—London to Rome and return direct, third class to the Italian frontier, and second class thence to Rome (meals not provided *en route*), with full board hotel accommodation in Rome: £14 19s. 6d. Passengers leave Victoria Station, London, on September 4 at 9 a.m., arriving in Rome at 11.45 p.m. on September 5; and leave Rome on September 16 at 8.20 a.m., arriving in London at 11.5 p.m. on September 17.

Tour 2.—London to Rome and return direct, second class throughout, reservations and meals *en route* included, with accommodation and full board in Rome: Grade A hotel, £22 10s. 0d.; Grade B, £20 5s. 0d. Passengers leave London on September 4 at 2 p.m., arriving in Rome at 11.30 p.m. on September 5; and leave Rome on Sep-

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tember 16 at 8.20 a.m., arriving in London at 7 p.m. on September 17.

Tour 3.—As Tour 2, but first class throughout and Grade A hotel in Rome: £27.

Members and delegates who desire to avail themselves of the *Official Tour to Poultry Breeding Centres* from September 16 to 21, should signify their intention of doing so when booking, in order that appropriate tickets may be issued and inclusive fare charged.

A *Special One Week's Extension* has been planned for those who desire to visit Perugia, Florence, Venice and Stresa on the return journey. The inclusive charge, comprising fares and hotel accommodation from September 4 to 24 will be, with first-class travel, £35 12s. 6d.; and second class, £26. Passengers on this tour arrive back in London at 3.30 p.m. on September 24.

Arrangements can also be made for visitors who desire to travel by sea or air. Full particulars of these and other facilities may be obtained on application to Mr. W. E. Walters, British Secretary to the Congress, 10, Whitehall Place, London, S.W.1, to whom subscriptions should be sent.

Agricultural Research Scholarships and Studentships for Research in Animal Health

THE MINISTRY of Agriculture and Fisheries and the Department of Agriculture for Scotland invite applications for the following *post-graduate* Agricultural Research Scholarships and Studentships for Research in Animal Health, tenable, as from October 1, 1933, for a period not exceeding three years:—

- (1) Three Agricultural Research Scholarships, each of the value of £200 per annum, to which will be added, if necessary, a sum not exceeding £50 per annum for fees and expenses.
- (2) Two Studentships for Research in Animal Health, each of an *inclusive* value of £300 per annum.

Applications must be received not later than June 15, 1933. Nomination forms and further particulars may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, or from the Secretary, Department of Agriculture for Scotland, York Buildings, Queen Street, Edinburgh, according to the country in which the candidate resides.

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South Devon Bull Recording Scheme

THE November, 1932, issue of this JOURNAL contained a note regarding the Cumberland and Westmorland Dairy Bull Testing Association. Another example of the increasing attention that is now being given to the use of bulls of proven merit is provided by the South Devon Bull Recording Scheme. The chief objects of the Scheme are as follows:—

- (a) To collect the whole of the information contained in the registers of all recorded herds and to use the combined statistics for the general improvement of the breed.
- (b) To maintain and improve the dual-purpose character of the breed by the systematic breeding, selection and distribution of prepotent bulls.
- (c) To estimate the milk transmitting power of all bulls used and bred in recorded herds.
- (d) To control the destiny of high-class bulls and prevent their premature slaughter.
- (e) To act as a bureau of information and exchange, particularly with regard to bulls.
- (f) To search out the best cows in the breed and endeavour to arrange for their being mated to proved bulls of equivalent merit.
- (g) To assist individuals and groups of small farmers by supplying them with selected bulls on special terms.
- (h) To supply purchasers of cows and bulls with milk pedigree certificates.
- (i) To obtain the advice of experts on matters relating to breeding and to carry out research work under their guidance.

The Committee of the South Devon Bull Recording Scheme has now purchased a proved bull, which is being made available for the service of members' cows under the Ministry's premium bull scheme.

The Scheme is worked in association with the South Devon Herd Book Society and the South Devon and District Milk Recording Society, but is conducted as a separate organization. The Hon. Secretary is Mr. T. Scott, The Cottage, Holne Chase, Ashburton, Devon. The annual subscription to the scheme is 10s. for one herd and 20s. for two or more herds, while there is an additional charge of 2s. for each milk pedigree supplied.

SPRAYING EXPERIMENTS ON THE CONTROL OF PEAR SCAB AT EAST MALLING

M. H. MOORE, Dip. Hort. Science (Reading),

East Malling Research Station.

Introduction.—Copper-containing sprays were successfully used against Pear Scab during the last decade of the nineteenth century and, possibly, even earlier. Lamson,^{2*} for example, reported favourable results in New Hampshire, in 1892, from spraying with Bordeaux mixture and with ammonium copper carbonate. Spraying recommendations for this disease were being made by other investigators at about the same period and, since that time, its control by spraying has been studied in numerous countries, including the United States, Germany, France, Spain, Holland, Austria, Norway, Switzerland, Australia, New Zealand and South Africa. Almost without exception, Bordeaux mixture was preferred to lime-sulphur, although certain writers devised spray-programmes based on the use of both fungicides, each at different times during the season.

In 1927, severe scab-infection of the flowers of several commercial pear varieties was noted at East Malling,⁶ indicating the necessity for pre-blossom spraying, yet this apparently had not been commonly practised in fruit-plantations in this country. Further, evidence was very scanty as to the efficacy of fungicides, other than Bordeaux mixture, against Pear Scab in England, although, on account of the existence of numerous "mixed" plantations, and of the fact that sulphur sprays were largely being used against Apple Scab, it was clearly desirable to know something of the capabilities of such sprays for controlling Pear Scab.

Thus, the present spraying experiments were begun in 1931, when a small plantation of eighty nine-year-old Fertility pear trees, "worked" on different Quince rootstocks, became available for experimental spraying. These experiments were continued and completed in 1932.

Arrangement of the Experiments.—Home-made Bordeaux mixtures, prepared with burnt lime and hydrated lime¹ respectively, were compared with lime-sulphur and with colloidal sulphur. Lead-arsenate was used with each

* For references, see p. 118.

CONTROL OF PEAR SCAB

in the first two applications, but not in the third. "Control" trees were arsenate-sprayed (to control caterpillar) at "white-bud" and petal-fall, but not afterwards.

There were twenty trees on each of four rootstocks, Quince A, B, C and D respectively. On Quince D, ten were sprayed with hydrated-lime Bordeaux and ten were controls. Five trees on each of the other three stocks were treated with burnt-lime Bordeaux, lime-sulphur and colloidal sulphur respectively, and five were controls.

Strengths of Sprays.

1931.

- (1) *Burnt-lime Bordeaux mixture*: 8 lb. copper sulphate, 8 lb. burnt lime, 100 gal. water, pre- and post-blossom.
- (2) *Hydrated-lime Bordeaux mixture*: 8 lb. copper sulphate, 12 lb. hydrated lime, 100 gal. water, pre- and post-blossom.
- (3) *Lime-sulphur (commercial)*: 1-30 pre-blossom, 1-60 post-blossom.
- (4) *Colloidal sulphur (commercial)*: 8 lb. per 100 gal. pre-blossom, 4 lb. per 100 gal. post-blossom.
- (5) *Lead-arsenate paste (commercial)*: 4 lb. per 100 gal. pre- and post-blossom.

A "wetter" or "spreader" was not used. For the second post-blossom application, 25 lb. burnt-lime instead of 8 lb. were used in No. 1 spray, and lime-sulphur in No. 3 was reduced to 1-100, both on account of spray-injury.

1932.

The same sprays were used except that lime-sulphur at 1-30, pre-blossom, replaced colloidal sulphur at 8 lb. per 100 gal. in No. 4 spray, and in No. 3, both post-blossom applications were made at 1-100. 8 lb. burnt lime was used for both post-blossom applications of No. 1.

Times of Application.—All fungicidally-sprayed trees received three applications, the first at the "white-bud" stage (see Fig. 1), the second at petal-fall and the third three weeks later.

Method of Application.—A horizontal barrel-machine was used, operated by hand and working at 200-220 lb. pressure per square inch. The trees were closely interplanted with plums and black-currants, and this hindered manipulation. Large hessian screens were used to prevent spray-drift.³

The lance was a "spray-gun" with a medium nozzle. It delivered a jet of fairly wide angle and moderate carrying-power, intermediate between a fine fog and a coarse drench, and, for this particular experiment, it provided an admirable type of spray. Parts of the plantation were rather exposed, and it was impossible to get good "cover" against the wind with a fine, fog-like spray of poor carrying-power. The lance was kept fairly rapidly moving so that the trees were not drenched. One operator

CONTROL OF PEAR SCAB

did all the spraying, and thus as much uniformity of distribution as possible was secured.

There was considerable Scab on the young wood of most trees at the outset.

The 1931 Experiment.—*The pre-blossom application* was made on April 22, when most of the trees were at the ideal "white-bud" stage, the leaves being still mostly rolled. The wood-buds were about half an inch long, green but still closed. There was a moderate westerly breeze, and most of the spraying was done in fairly warm, sunny weather.

The first post-blossom application was made at petal-fall, on May 15, 16 and 18, in dull, still weather. Rain fell each day after application, but the spray-deposit had already dried.

Pre-blossom spraying with burnt-lime Bordeaux mixture had caused two parallel rows of scorched spots to appear on the undersides of the leaves, where the rolled edges had been most accessible to the spray (see Fig. 1). Some of the blossom-trusses must have been damaged also, for they had set no fruit. No appreciable injury was caused by the pre-blossom sulphur sprays.

Leaf-burn was apparent on May 18 on trees sprayed two days previously with lime-sulphur (1-60), and further damage seemed imminent.

Observations made on June 3.—Scab attacked the fruits long before the leaves, a phenomenon peculiar to pears. The various parts of pear flowers frequently show Scab at blossom-time, and pre-blossom spraying is essential.

Colloidal sulphur (0.4 per cent.), post-blossom, had caused no apparent damage but had not checked Scab, as will be seen by Fig. 2. Severe infection had occurred on lately-formed flower-trusses. The pre-blossom application at 0.8 per cent. had not adequately controlled early infection.

The withering effect of severe, early Scab-infection is illustrated in Fig. 3, which shows an unsprayed fruit-truss of Beurré d'Amanlis just after "setting." The fruits and leaves were blackened by Scab.

Spray-damage.—Trees sprayed post-blossom with lime-sulphur (1-60) showed severe leaf-burn but no damage to the fruits. Injured leaves showed marginal curling-up of the blade, extending, in severe cases, nearly to the mid-rib. This spray evidently was too strong for Fertility, and

CONTROL OF PEAR SCAB

dilution to 1-100 for future post-blossom sprayings was considered advisable.

Burnt-lime Bordeaux mixture had caused very severe injury. Both fruits and leaves were badly scorched, and leaf-drop and some fruit-drop resulted. The type of leaf-burn caused by Bordeaux was very different from that due to lime-sulphur. With Bordeaux, numerous small, reddish-brown (sometimes purplish), isolated spots speckled the leaves, while with lime-sulphur the burnt areas were patchy and mostly marginal, pale brownish-red at first, darkening as the areas shrivelled.

Hydrated-lime Bordeaux also had caused severe injury to the fruits but not to the leaves. As with the burnt-lime mixture, the skin of the pears seemed to be scorched, and adhered in hard, flattened "scales." These sloughed off before picking-time and left the fruits with an attractive uniform-russet "finish" (see Fig. 4).

Explanation of Damage by Bordeaux Mixtures in 1931.—The Bordeaux-damage described was most unexpected, and is to be explained as follows.

In previous experiments, the strainer of the spraying machine had proved too coarse to retain all the grit in the burnt-lime mixture. Hence it was intended to strain each mixture through butter-muslin and so avoid blocked nozzles later. Unknown to the writer, the "milk of lime" had been strained through muslin before the copper sulphate solutions were added. Each of the mixtures, when used at "white-bud" and petal-fall, was thus deficient in lime, for the muslin had retained much that should have taken part in the chemical reaction necessary to the making of a good Bordeaux. It was found that the muslin retained much less of the hydrated lime than of the more coarsely-particled burnt lime, and this probably explains why less damage was caused by the mixture made with the former.

Such an occurrence affords striking proof of the need for great care in preparing Bordeaux mixture, which, strained only *after* making, was quite safe to use (see below).

The second post-blossom application was made on June 5 in cloudy weather, with a fairly strong north-east wind. Certain modifications in the sprays used have already been noted on page 112. No injury resulted from this application.

The 1932 Experiment.—*The pre-blossom application* was made on April 29 in dull, warm weather, with a light

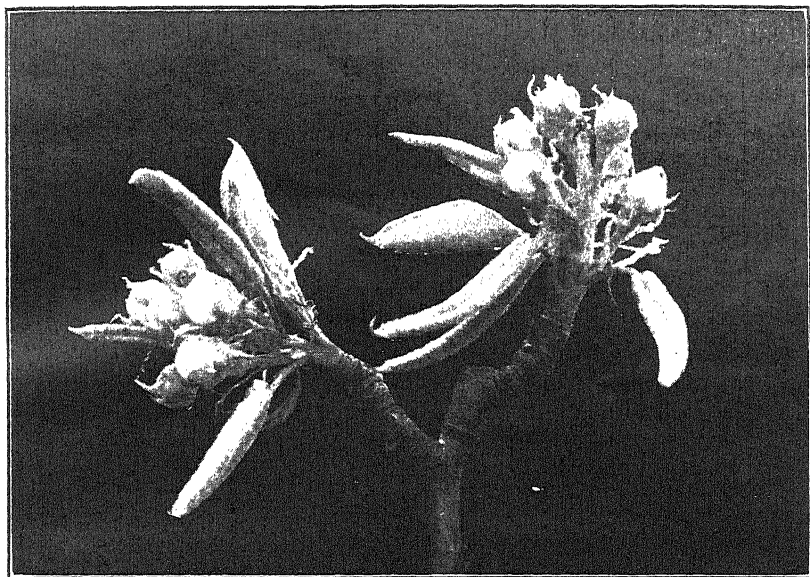


FIG. 1.—“ White-bud ” stage in *Fertility* pear.

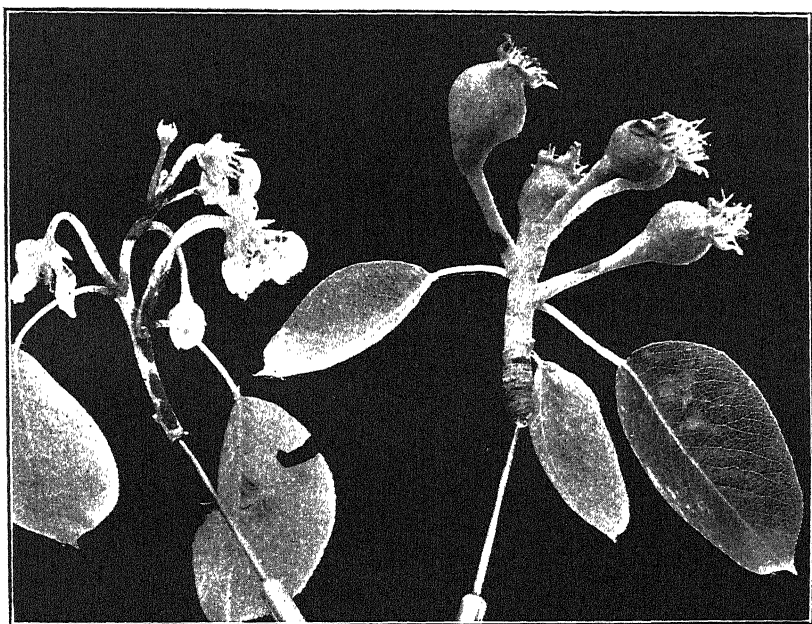


FIG. 2.—Flower-truss and fruit-truss from *Fertility* tree sprayed at “ white-bud ” and “ petal-fall ” with colloidal sulphur. Note severe Scab infection on floral axis and on young fruits and fruit-stalks. (1931.)

To face page 114.

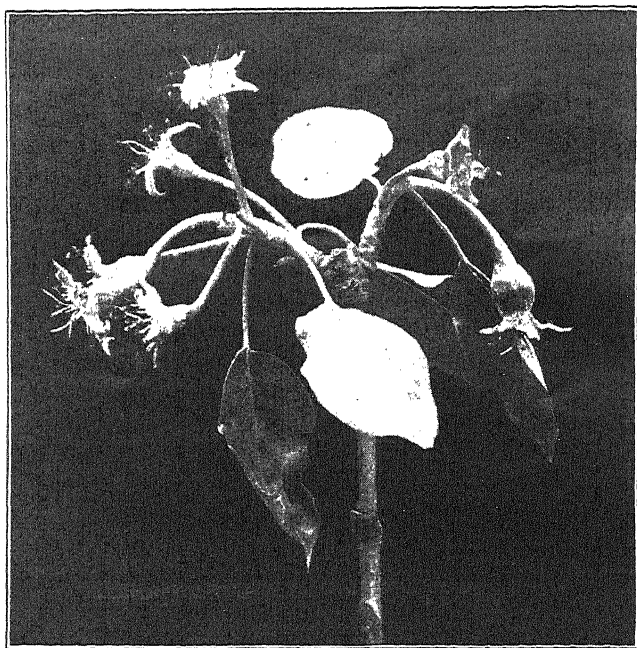


FIG. 3.—Severe Scab infection on leaves and fruitlets of *Buerré d'Amanlis* (unsprayed) just after setting.

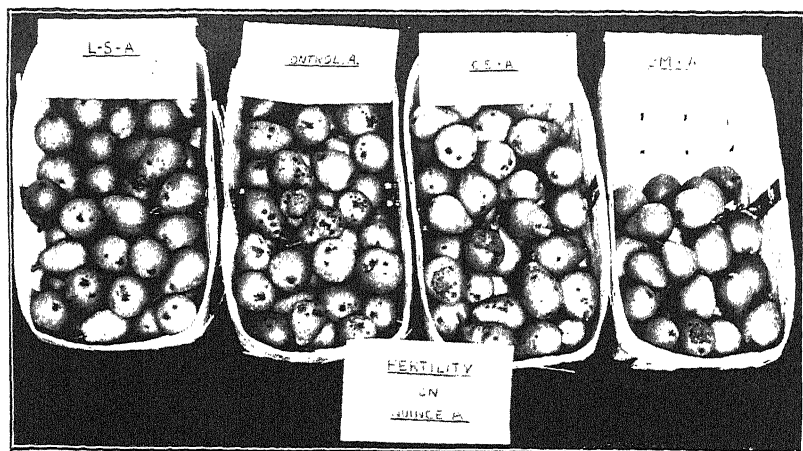


FIG. 4.—Random samples of picked fruit from differently-sprayed *Fertility* trees on Quince A. Arranged to show most badly-scabbed fruits in top layer. Note attractive, uniform-russet "finish" with Bordeaux. Unsightly "scales" of burnt skin (mentioned in the text) had sloughed off long before picking-time.

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south-easterly breeze. Most trees were at the "white-bud" stage shown in Fig. 1. Rain fell during the night after application.

The first post-blossom application was begun on May 23, at petal-fall. Lime-sulphur and colloidal sulphur had been applied, and spraying with Bordeaux mixture had commenced, when a heavy rain-storm prevented further spraying that day. The two sprays already given had then dried. Spraying was continued on May 24 in cold, cloudy weather, with a strong north-easterly breeze.

There was little damage from the "white-bud" application. Both the burnt-lime and hydrated-lime Bordeaux mixtures had caused slight brown spotting on the petals and, as in 1931, on the undersides of the rolled leaves. No appreciable injury was caused by lime-sulphur applied pre-blossom.

The second post-blossom application was made on June 13 in bright, warm weather with cloudy intervals and a strong north-east wind. No serious damage from the petal-fall application was seen, but a few fruits on trees sprayed with burnt-lime Bordeaux showed slight skin-burning.

Spray-damage in 1932, therefore, was negligible. Reduction in strength of lime-sulphur from 1-60 to 1-100, post-blossom, made it safe to use on Fertility, while the "full-strength" Bordeaux mixtures were also safely used pre- and post-blossom* without resort to "excess-lime." However, the quality of burnt lime tends to vary according to the source from which it is obtained, and it may be wise, where burnt lime is preferred to hydrated lime, to use the "excess-lime" formula (8-25-100) *both pre- and post-blossom*, for safety's sake. (Even a "pink-bud" Bordeaux-application caused severe fruit-injury on the Cox's Orange Pippin apple³).

Results.—A complete analysis of the figures obtained cannot, for reasons of space, be given here, but is included in the *East Malling Research Station Annual Report for 1932, (May, 1933)*.

The fruits were thinned to "singles" each year about two months after "setting." Both thinned and picked

* Salmon and Ware⁵ noted that "Bordeaux mixture is, in our experience, the best fungicide to use against Pear Scab; it is quite harmless to the foliage of any variety of pear, whereas lime-sulphur is not so strong a fungicide and when used on some varieties, e.g., William's Bon Chrétien, may injure the foliage."

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fruits were scab-graded by a "category" method³; the figures were averaged, and the Relative Efficiency of each spray, based on infection on the controls, was calculated. The summary of results is set out below.

FERTILITY PEARS: SUMMARY FOR THINNED AND PICKED FRUITS TOGETHER.

Spray	1931					1932				
	Efficiency* on Quince				Average	Efficiency* on Quince				Average
	A.	B.	C.	D.		A.	B.	C.	D.	
Coll. sulphur†	0	56	59	—	38	43	65	39	—	49
Lime-sulphur	83	79	88	—	83	79	73	68	—	73
Burnt-lime B.M.	96	67	88	—	84	73	66	87	—	75
Hyd.-lime B.M.	—	—	—	67	67	—	—	—	86	86

* The maximum is 100.

† Lime-sulphur was used pre-blossom in 1932.

Colloidal sulphur, pre- and post-blossom, gave poor results in 1931, and although some improvement in the average was shown in 1932, when lime-sulphur was substituted for it pre-blossom, the final result was still unsatisfactory.

Lime-sulphur and burnt-lime Bordeaux gave practically equal control, but Bordeaux kept a higher proportion of fruits clean and was, therefore, better commercially. Nevertheless, the Scab-spots were larger, on the whole, with Bordeaux than with lime-sulphur, although, with the latter, there was more late infection, doubtless due to reduction in strength of the spray for post-blossom application. These results are illustrated in Fig. 4, which shows random samples of fruits from differently-sprayed trees on Quince A stock.

Hydrated-lime Bordeaux was less effective than the burnt-lime mixture in 1931 (when it caused less damage) and more effective in 1932 (when no damage accrued from either spray). As the former is the easier to prepare, and probably the more reliable, it should be preferred.

Bordeaux mixture was less effective on trees on Quince B than on those on either Quince A or C in both years. A differential reaction of rootstock to spray-treatment is indicated. The influence of rootstock on the incidence of Scab was shown by the controls, as with apples.^{3,4} Quince C induced greater susceptibility than either Quince A or B.

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Spray-damage was reflected in cropping. Burnt-lime Bordeaux, applied pre-blossom, damaged the flower-trusses in 1931, reducing the "set," and the effect of foliage-injury in that year was shown in 1932, for these trees cropped less heavily than the controls. (A similar effect has been noted on apples^{3,4}). It should be recalled, however, that leaf-burn in 1931 was due to the inadvertent use of a lime-deficient mixture for the first two applications. The hydrated-lime mixture caused no crop-reduction in either year (the injury was confined mainly to fruit-russetting), but slight reduction was shown in 1932 by trees damaged at petal-fall in 1931 by lime-sulphur (1-60).

Scab was generally more severe in 1932 than in 1931. A cold, wet spring prolonged the pre-blossom period in 1932, and, as with apples, two pre-blossom sprays were really necessary for best results.

Recommendations.—The conditions under which these trials were made possibly rendered control of Pear Scab unusually difficult. Fertility is extremely susceptible to Scab and, apparently, somewhat sulphur-shy post-blossom; 1931 and 1932 were very bad "Scab years"; the trees bore much scabbed wood at the outset, and they were so closely interplanted that spraying was made difficult. Yet the results should be of the more value to the average grower because they were obtained under non-ideal conditions. Both Bordeaux mixture and lime-sulphur gave good "commercial" control, which doubtless could be enhanced by an extra spraying pre- or post-blossom according to seasonal conditions.

Pear Scab seems to be more difficult to control than Apple Scab, especially when sulphur sprays are used, for these have to be much diluted, for application post-blossom, to avoid injury. Nevertheless, the presence of red-spider will sometimes render lime-sulphur preferable to Bordeaux. Sometimes Bordeaux is used pre-blossom and lime-sulphur post-blossom, where spider is prevalent. This, however, might perhaps increase the risk of "sulphur-shock"; if this occurs, the remedy would appear to lie in the use of lime-sulphur pre- as well as post-blossom. A more detailed analysis of the present results than is shown here indicates that lime-sulphur, pre-blossom, may give even better control of *early* infection than Bordeaux, although, of course, Bordeaux checks late attack better. Lime-sulphur would also be more convenient where pears and apples are

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interplanted if the apples were also to be sprayed with it.

Where pears form an important source of revenue, and post-blossom lime-sulphur applications must be made to control red-spider, a third post-blossom spray, at 1-100,* at the end of June or up till mid-July, would undoubtedly prevent much of the late infection shown by trees sprayed with lime-sulphur in the present experiments. The value of the fruit would be considerably improved by this late application, for late attack tends to counteract the good effected by the earlier sprays.

Where red-spider is absent and other conditions (intercrops, undercrops, &c.) are favourable, hydrated-lime Bordeaux mixture would appear to be the best spray to use.

Pruning-out scabbed wood in the winter, especially on Fertility, would also help to control this disease by removing primary sources of infection. The cumulative effect of spraying, moreover, would be beneficial in this respect.

Summary.-Spraying experiments at East Malling on the control of Pear Scab on Fertility are described, the results are discussed, and recommendations based on these results are made. Three applications (at "white-bud," petal-fall, and three weeks later) of Bordeaux mixture made with hydrated lime are considered to be a good basic spray-programme. This should be supplemented if necessary according to seasonal conditions. Modifications of this programme to suit certain local conditions are suggested. Brief reference is made to the influence of rootstock on the incidence of Scab and on the reaction of trees to spray-treatment.

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- 1 *Goodwin, W. and Salmon, E. S.* "Notes on two Fungicides: Sulphur and Bordeaux Mixture": *This Journal*, **34** (Sept., 1927), 517-528.
- 2 *Lamson, H. H.* "Spraying against Pear and Apple Scab": *New Hampshire Agric. Exper. Sta. Ann. Rep.*, **3-4** (1892), 217-218; 238-239.
- 3 *Moore, M. H.* "The Incidence and Control of Apple Scab and Apple Mildew at East Malling": *Jour. Pom. and Hort. Sci.*, **8** (Aug., 1930), 229-247.
Idem, **8** (Dec., 1930), 283-304.

* Observations at the Research Station have shown that lime-sulphur (1-100), post-blossom, is generally safe to use on all commercial varieties of pears.

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- 4 Moore, M. H. "Further Studies on the Incidence and Control of Apple Scab (*Venturia inæqualis*) and Apple Mildew (*Podosphaera leucotricha*) at East Malling": Jour. Pom. and Hort. Sci., 10 (Dec., 1932), 271-294.
- 5 Salmon, E. S. and Ware, W. M. "Apple and Pear Scab": This Journal, 31 (Sept., 1924), 546-554.
- 6 Wormald, H. "Notes on Plant Diseases in 1927": East Malling Res. Sta. Ann. Rep. for 1926 and 1927. II. Supplement (Oct., 1928), III-118.

THE HARLEIAN DAIRY SYSTEM

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Cirencester.*

THE above title is that of a book which was written by William Harley and published, in 1829, by James Ridgway of Piccadilly, London. The author was a man of many parts; though, by training, he was a cloth manufacturer, he nevertheless interested himself in diverse kinds of public welfare work in the city of Glasgow. The achievement of which he seemed most proud was the founding of the famous Willowbank Dairy, on the outskirts of Glasgow, for the express purpose of producing and distributing a supply of clean and pure milk to a populace that was very indifferently served by the unscrupulous owners of town dairies who, up till then, had the monopoly of supply.

William Harley must have been a man of outstanding ability. Many of his teachings regarding the housing of dairy cattle, clean milk production, and the organization of a retail trade, are thoroughly sound when examined in the light of present-day knowledge. As a pioneer of "better" milk production, Harley deserves much greater fame.

The following extracts have been culled from his book:—

Milk and Public Health.—"It has been remarked by many authors of intelligence and observation, that in those communities where a liberal supply of genuine milk is obtained, fewer premature deaths have occurred"

A Reference to Price Cutting in Retail Distribution.—"The Author deems it but justice to state that, throughout the whole undertaking, his object was never avowedly to bring down the price of milk, so as to conquer opposition, but simply to supply a pure unadulterated beverage, such as would at once benefit the citizens, and yield an adequate return upon the labour and capital employed in the business.

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At the very beginning, therefore, he fixed the price at six pence the Scotch pint, which he conceived a fair remuneration, although the current charge among the small dealers, as already mentioned, was at that time not less than eight pence. There was some dissatisfaction manifested at this resolution among the dealers at first, but it soon subsided; and in truth there was not much reason for complaint. It has always been a fixed principle laid down by the Author, that any article he was engaged in manufacturing, or dealing in, never to undersell, but to compete only in regard to quality, and to sell at a fair price."

His repeated Emphasis upon the Need for Cleanliness in handling Milk.—"As before observed, one of the most prominent features of the Author's system is attention to cleanliness. In no article of food is cleanliness so essentially necessary as in the management of milk, whether sold in its liquid state taken directly from the cow, or manufactured into butter, or cheese; milk, it is believed, may be tainted more easily than any other liquid, either by mixture, by contact with foreign substances, or by impure air; hence the propriety of cow-houses being built in airy situations and well ventilated."

"There was a scullery, or kitchen, adjoining the milk office, into which hot and cold water were brought for washing the vessels. There was also a boiler, in which, after being washed and rinsed, these were scalded. They were then dried upon a rack, and the milk pitchers, measures, etc., were taken to the milk office and set in their proper places."

Also: "Each milker had a coarse towel, a washing cloth, a curry-comb and a hair cloth."

Buildings planned and erected by Harley.—The last cow-house which he had erected was upon "a grand scale and adapted to contain one hundred cows." The cows were stalled in four rows of twenty-five, with feeding passages, 5 ft. in width, in front of the mangers. Ventilation was secured by using roof slates that were hung on pins and not lime pointed, whilst the building was very well equipped with windows in the sides and roof.

The actual standings and mangers are best described in Harley's own language:—

"The floor on which the cows stood was raised six inches above the passages; this not only showed the cows to greater advantage, but kept them dry and clean; and two and a-half feet of the floor next to the trough was made of composition, similar to what is commonly used in making barn floors; because the principal weight of the cows being upon their four feet, and as in lying down the whole weight is upon their knees, it was obviously desirable to have that part of the stall as smooth and soft as possible. Indeed, it is conceived that joists and flooring would be the best for that purpose, were it not for the expense. The back part of the stall was of hewn stone; and for about eighteen inches towards the groove there was an inclination of about half-an-inch to let the water go off; and these eighteen inches were of stript ashlar transversed, the strips being about an inch separate; this prevented the feet of the cows from slipping. In all cow-houses, perhaps, the front part of the stall should be rather lower than the back part, since it would enable the cattle to lie easier; and besides this, they would not be apt to slip their calf."

"The advantage of the head, or feeding passages, was great, and much saving, both of time and provender, accrued from them; as one person will feed four times as many as by the old mode of crossing the

THE HARLEIAN DAIRY SYSTEM.

groove and carrying the food from behind the cows, a part of which was usually lost in the grooves; besides, the feeders in this way avoided all danger of being hurt by the cows in going up between them when they were keen for their food, and of course somewhat unruly."

Further, it is interesting to note that the bottom of the feeding trough was on a *level* with the stalls! The stalls were 9 ft. 6 in. in width for each pair of cows, the standings 6 ft. in length, and the "groove" (gutter) 1 ft. 6 in. in width. These latter dimensions are the only ones to which serious exception can be taken.

The fact that the cowshed was built on the side of a hill, permitted the adoption of an ingenious system of manure disposal. One side of the building was at ground level, the other being supported on brick arches. This enabled carts to be backed in under the building, and by opening iron trap doors in the actual gutters, the droppings could be scraped along to fall directly into the carts. What an instance of labour-saving ingenuity!!

Harley was very proud of his premises and methods, and encouraged visitors—but the number of these so increased that he had to erect a special balcony in the cow-house from which "a bird's eye view of the whole interior of the cow-house, and its hundred cows, could be obtained at one glance." In the most modern cowshed in the whole world—that of the Walker-Gordon (New York) Dairy—there are provided similar facilities for inspection!

Additional buildings housed a food store engine and boiler. The engine supplied power for food preparation and churning, and a liberal supply of steam was necessary for cooking the food or "mash," for the cows were fed largely upon cooked sliced roots. This summary of the dietary may be quoted:—"The provender commonly used at Willowbank consisted of hay, straw, grass, and green barley; also Swedish turnips, and the different varieties of Aberdeen Yellow, red tops, etc., also mangel wurtzel, carrots, cabbages, ground oil cake, bruised beans, and other grains."

An Early Reference to Recording.—

"One day in the week (Friday was the usual day), the quantity of milk produced by each individual cow was measured, morning and evening. The clerk, or the person who carried the milk into the milk office, had the number of the cows upon a slate; and as each cow was milked, the pitcher was placed upon a table in the transverse passage. By looking at the white stave, the quantity was at once seen and marked upon the slate, and afterwards transferred to the proper column in the milk book."

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Moreover the efficiency of the milkers was checked in the following manner:—

“ To ensure the cows being completely milked, the milker of No. 1 stripped, or took the aftering, of No. 2, etc.; a small premium was given weekly to the milker who produced the greatest quantity from stripping. This induced each to be careful in milking their respective lot as completely as possible.

The milkers changed their respective lots of cows each other weekly, and by rotation, which showed who were the best milkers. Each milker's name was entered at the top of the list of their own lot of cows, and in this way the alternate weekly change was effected without mistake or irregularity.”

In introducing a similar system eight years ago, I thought I was doing something original!

Harley's Dairy Cows.—The following extract shows that deep-milking cows were obtainable in those days:—

“ The middling and larger size of cows was preferred, such as weighed from thirty-five to fifty stone, English. The Author bought one very large fine cow for £30; he got £3 for the calf without being fed, and he sold the cow to a butcher for £28. For a considerable time this cow gave forty quarts per day, and was milked three times each day. He had a number of other very fine cows, which when newly calved and highly fed produced from twenty-five to thirty quarts per day.”

Harley was obviously fond of his cattle as well as devoted to his enterprise, as witness the following:—

“ Cows should never be struck or scolded, but spoken to and dealt with in the kindest manner; when struck they will either attempt to kick, or throw themselves down. By persevering in kind and gentle treatment, it was found that in a short time the crossdest Willowbank cows became peaceable and easily managed; whereas by a contrary plan, and if not curried or clean milked, they became irritable and restive and uniformly got worse instead of better. If there are any exceptions in cows thus treated, they must be very rare; indeed, there are few of the wild and ferocious animals but may be tamed by kindness. Cows, like many other animals, are partial to a pleasing sound. It was found by experience at Willowbank that cows were very fond of having a tune hummed or sung by the dairymaid whilst milking.”

Of the evils of indigestion in dairy cows, Harley wrote as follows:—

“ The quantity of food given to the animals varied according to the quality or richness; but it was found very necessary to attend as particularly to quantity as to quality; because rich food, by itself, could not be taken in sufficient quantity to fill the stomach, neither would it digest. The general rule in feeding, therefore, was to give as much good wholesome stuff to each as the cattle would eat clean up, always taking care, however, to administer it rather sparingly than otherwise in order to avoid giving them a surfeit. It is of the utmost importance to attend to this; for if the cow loathes her food, she will neither milk nor fatten. The usual mode of curing a surfeit in the Willowbank Establishment was to take the vessel from any cow that appeared to have little inclination for food; her stall was then marked with chalk to prevent mistakes; and at next feeding time an empty dish was set before her. This practice was continued until the animal showed something like keenness of appetite, when a

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small quantity of food was given her, which was afterwards gradually increased to the extent of the customary meal."

It is difficult to realize that this treatise was published over 100 years ago.

FRUIT GROWING IN ESSEX—II*

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The Technique of Production.—The reputation that established growers have made for Essex as a county in which dessert-apples may be grown successfully seems to indicate sound methods of production. The term "established grower" may be misleading, for in Essex we are apt to look upon a grower with trees 10 or 12 years old as an experienced grower. It has been easy for the younger growers to discard old theories which modern research work has discountenanced. The rapidity with which fruit growers in the county respond to new ideas is evidence of their keen interest in their work, and a tribute to the Research Stations that provide the new information.

Manuring and Cultivation.—On the lighter soils in Essex, heavy dressings of potash are essential. An excellent manurial demonstration, modelled on the lines of the East Malling Experiment, has been conducted on the farm of Mr. W. Lawrence Taylor (Lathcotes, Galleywood, Chelmsford). The effects of low nitrogen, deficiency of potash, and the general relationship between the two, are very clearly brought out in an experiment on young trees carried out over the last five years. The experiment serves as a guide to fruit growers on that particular type of soil.

Nitrogenous dressings are used sparingly on Worcester Pearmain, and the treatment of Cox's Orange Pippin varies from the successful method of one notable grower in the county, who manures heavily with all three constituents, and practises intensive cultivation and heavy summer pruning, to a more moderate dressing of potash, with nitrogen feeding and occasional phosphatic dressings, and a normal spur pruning of this variety.

On established plantations, the tractor, two-furrow plough, disc and spring-toothed harrows are the most

* Part I of this article appeared in the issue for last month (April, 1933), page 50.

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common implements used. On heavier soils, the land is ploughed up to the trees in the winter leaving a water furrow between the tree rows. Subsequent ploughing close to the trees in spring, and cross cultivation with disc harrows and spring-toothed harrows, keep the land clean during the summer months. On many farms, weeds are allowed to grow from the end of July onwards, to be ploughed in as green manure in the autumn. Other growers cultivate more strictly and use organic manures, such as shoddy, feathers and feather waste, or plough in green manure crops, such as mustard, to maintain a supply of humus.

Winter Pruning.—Most growers leave winter-pruning operations until after the bulk of grading and packing has been finished. An endeavour is made to finish pruning before winter-spraying begins. Growers at the present time spray late in the dormant season with winter wash, and consequently try as far as possible to avoid spraying wood that is to be removed. Worcester Pearmain is lightly pruned and allowed plenty of freedom, Cox's Orange Pippin, on the gravel soils, is hard pruned, Bramley's Seedling merely thinned out, while Monarch seems to bear if treated like Bramley's Seedling, and also stands up to a harder pruning.

Spraying.—For the production of first-quality apples, a heavy spraying programme is a necessity. Essex has its quota of pests and diseases, and the control of these is perhaps the major concern of fruit growers. Most commercial growers spray five times in the year. It is the general practice to spray with a tar-oil wash in winter and follow this up in the spring with three sprayings of a mixture of lime-sulphur and lead arsenate, and an extra spraying with nicotine and soft soap for the control of Apple Sawfly. Some growers use more than three spring sprayings for scab control, but there are few who use less.

Winter-spraying of fruit trees is confined to the tar-distillate wash, used with pressure at a general strength of $7\frac{1}{2}$ per cent., and a satisfactory control of aphid has been obtained. Owing to freedom from Capsid Bug, growers are saved the expense and labour of applying an extra winter wash.

Although scab disease is well under control, the problem of a more complete control is one of the growers' chief

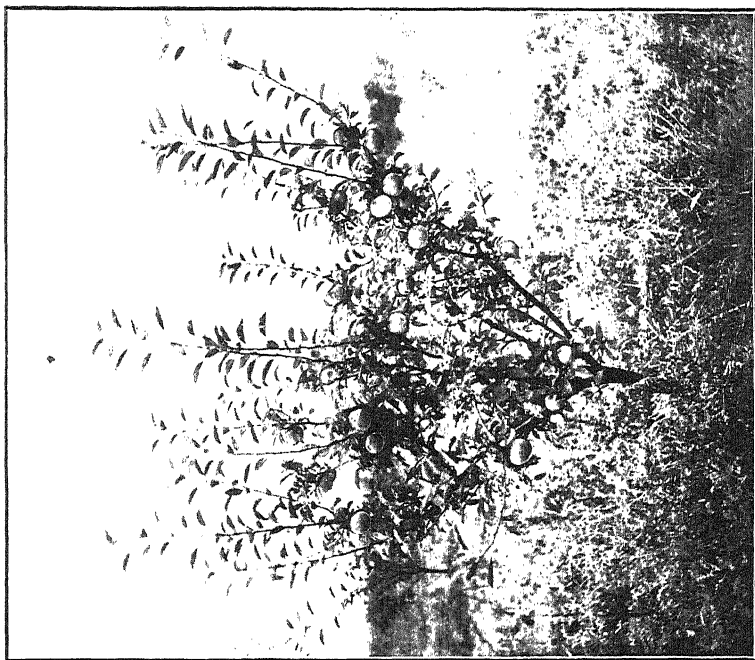


FIG. 1.—Cox's Orange Pippin tree manured with nitrogen and potash.
FRUIT GROWING IN ESSEX.—II.

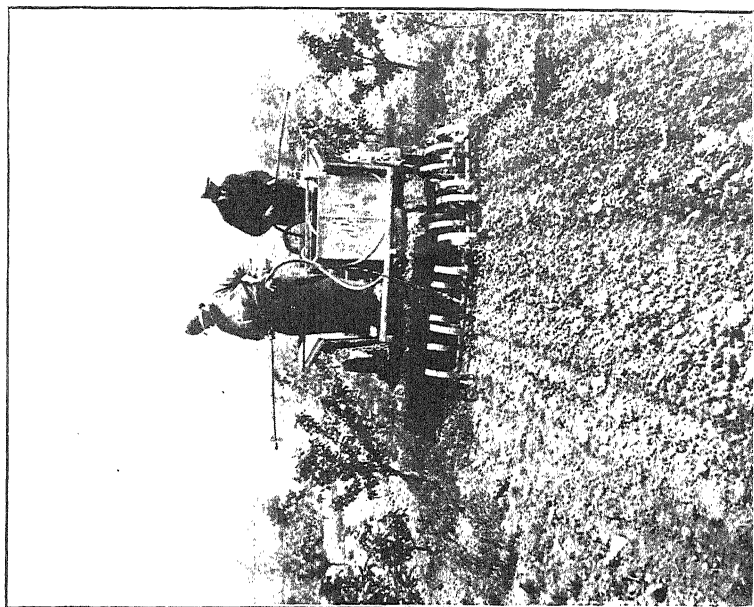


FIG. 2.—Combined Cultivator and Spraying Machine; two rows of trees being sprayed simultaneously.



FIG. 3.—Cordon Growing in Essex.



FIG. 4.—An Essex Fruit Grading and Packing Station.

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anxieties. As scab control is so bound up with nutrition, the number of spring sprayings carried out is variable, some growers using three and others, where there is severe wood infection, using twice that number. The chief modification in the spring-spraying programme is to spray earlier, the maximum number of applications being made before the blossom opens. The control of scab disease is more difficult on Worcester Pearmain than on any other variety. Every endeavour is made to maintain a balanced manurial treatment of this variety, but if it is suffering from excess nitrogen, or allowed to become overcrowded, even an abnormal number of sprayings will not control scab to the degree obtained on other varieties. Cox's Orange Pippin seems to show a better reaction to spraying methods for scab control. If, however, a spraying is missed, or the variety suffers pronounced "lime-sulphur shock," or if there has been faulty mixing of the spray fluid, there is a reaction leading to diminished weight of crop.

Lime-sulphur is employed almost solely as the spray fluid against scab disease. Some growers use Bordeaux mixture for the earliest applications and follow with lime-sulphur. The extra advantages of checking red spider, however, and the non-russetting of the fruit, constitute sulphur as the commercial growers' spring wash. Sulphur dusts have been tried. At first, growers were inclined to place too much faith in them, with the result that a return to the wet sprays immediately followed. It is now expected that dusting will return for post-blossom work and for applications against late infections of scab which produce spots on the fruit and spoil the grade. Lead arsenate is added to each spring spraying for caterpillar control.

Apple Sawfly is a widespread and severe pest in Essex. Fruit growers are satisfied with the control obtained with nicotine and soft soap, but, in common with growers in general, they find the spraying period just after blossom-fall a busy one. At the present time, troubles that are causing Essex growers some concern are late attacks of tortrix moth caterpillars and "bitter pit."

The installing of a central power pumping plant with underground mains, is becoming more popular with growers, and several established plantations are being fitted with this system of spraying machinery. Headland power sprayers and portable power outfits are in common use, but water in Essex is often not easily obtainable, and con-

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siderable labour is used in carting water on many farms. It is hardly likely that the number of sprayings used on fruit plantations will decrease, and the necessity of being able to spray the plantation in as short a time as possible is a considerable advantage. Climatic conditions, also, will probably necessitate the continued use of wet sprays. The greater use of the central pumping plant with underground mains is, therefore, a wise development.

Thinning.—If quality in apples is characteristic of the produce of Essex, it is mainly due to the high standard of pest and disease control obtained, and to the careful and judicious thinning of the fruit. The two operations are dependant on each other, for to spray and to neglect to thin is to throw away half the benefit of a clean sample. The degree of thinning carried out to produce an even crop naturally depends on the variety, the state of health and the vigour of the tree. Worcester Pearmain is often thinned down to one per truss, and Cox's Orange Pippin to one or two per truss. At the end of the season, it is generally found that thinning could have been a good deal more drastic, but it needs a certain degree of courage at thinning time to take a thousand or more apples off one tree. The importance of this operation cannot be overestimated.

Picking and Storing.—As the predominant varieties grown at present are dessert kinds, and considerable labour and expense are spent on producing high-quality fruit, great care is observed in picking and storing so that damage may be reduced to a minimum. Picking-buckets are almost always employed by the pickers, the apples being transferred to orchard boxes. The picking-bucket has a detachable canvas bottom, which when unhitched allows the fruit to be lowered into the orchard boxes. The box is of the usual type holding a bushel, having straight sides with all edges bevelled, and the handles are "staggered," thus allowing the boxes to be interlocked. Apples in these boxes can be stored either in natural storage or cold storage. With either method, the apples are gone over carefully before storing and damaged fruit removed. Methods of natural storage vary from underground stores, with a straw insulated superstructure, to the use of barns, sheds and buildings. Some growers have built above-ground structures of insulating material. Bramley's Seedling is often stored in large clamps

FRUIT GROWING IN ESSEX—II

over a floor of straw, the heap being covered with straw and a tarpaulin slung above the clamp.

Home cold-storage is now receiving the attention of growers. A cold store has recently been built at the Great Leighs farm of Messrs. Seabrook & Sons, Ltd. Use has been made of cold storage facilities offered in the town, but this fruit has to be wrapped and packed, transported to the cold store and then examined and repacked before sale. All evidence points to the advisability of having the cold store at the point of production. At least one other cold store will be built in Essex this coming season, and a number of growers with young plantations intend to erect a cold storage plant when their crop justifies it. Extending the season of Cox's Orange Pippin and Bramley's Seedling is the main purpose of the cold store in Essex. Worcester Pearmain is also cold stored, but the sale of this variety long after its season does not justify holding back large quantities.

Marketing.—As so much importance is attached to spraying and thinning, careful grading and packing naturally follow, and marketing is made easier by the increasing thoroughness with which these two operations are carried out.

In Essex, there is little need to emphasize the value of a high standard of grading and packing. Most of the fruit farms are comparatively modern, and growers have started with the full knowledge that grading and packing in standard non-returnable packages is profitable and desirable from every point of view. Most farms are of such an area as to warrant the use of machines that size either by weight or by diameter. Both these types of machine are in common use, with a tendency now towards the weight-sizing type of "grader" because of its greater accuracy. On the few scattered farm orchards and small holdings, the importance of grading and packing have not yet been fully realized. Efforts are being made to overcome the difficulties of the small holders, but the co-operative marketing system tried in the Boxted Small Holding district failed through the holders' inability to co-operate. With increasing standardization of grades and packs, the difficulties facing the small holder should be lessened. As regards the older farm orchards, there is in the county a perfect example of the "renovated orchard." One of the oldest renovated

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orchards in the county is that belonging to Colonel F. H. D. C. Whitmore at Orsett, who has now installed a Cutler grader to deal with the crops. It only remains for all owners of farm orchards to follow this excellent example.

Various growers are registered under the National Mark Scheme, and others pack to the standards set out in the scheme, but use their own trade mark. The still wider adoption of the scheme for apples is, however, most desirable. The standardization of the products of the fruit industry is bound to benefit the home growers. It may be true that, where a goodwill connexion has been established, transference to the scheme at the moment will not bring an individual benefit, but the inevitable beneficial effect on the industry as a whole is a long view of the matter worth considering.

Production Costs and Returns.—Growers in the county are of opinion that the production costs per acre on established trees total about £40 per annum. This is a very general estimate, as costs are bound to vary with the methods of production used, the season, and the accuracy with which costs are determined. Table IV gives the revised figures of Messrs. Seabrook & Sons, Ltd., for the cost of production per acre of 200 trees, from the tenth year onwards, assuming that the cost of establishing has been defrayed by interplanted soft fruits.

TABLE IV.

	£	s.	d.
Rent	2	0	0
Pruning at 3d. per tree	2	10	0
Spraying tar oil	5	0	0
Spraying lime-sulphur (4 times)	10	0	0
Ploughing	0	9	0
Cultivations	0	6	0
Brushing grass	0	9	0
Thinning fruit at 2½d. per tree	1	17	6
Picking at 3d. per tree	2	10	0
Carting	0	10	0
Packing and carriage	15	0	0
Manuring	2	0	0
	<hr/>		
	£42	11	6

Returns are also a very variable quantity. Actual figures supplied by a grower in the county for returns on Worcester Pearmain and Bramley's Seedling are given in Table V. These returns were obtained from part of a field of 12 acres, planted, in 1912, as bushes on Type II, 12 ft. apart. They

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must be regarded as exceptional, and do not represent the average returns obtained by fruit growers for these two varieties, but they do indicate what can be done. The figures show the variability over a period of years, and may form an interesting comparison for other growers over the same time. We are indebted to Mr. W. Lawrence Taylor for the figures in Table V.

TABLE V.—RETURNS ON BRAMLEY'S SEEDLING AND WORCESTER PEARMAIN.

Year.	Bramleys.				Cash Receipts.		
					per Acre.		
					£	s.	d.
1922	106	9	0
1923	21	0	5
1924	70	15	8
1925	43	0	8
1926	54	8	10
1927	175	6	9
1928	124	15	4
1929	168	14	4
1930	146	3	4
1931	262	12	5

Year.	Worcesters.				Cash Receipts.		
					per Acre.		
					£	s.	d.
1922	86	13	3
1923	16	8	4
1924	4	1	9
1925	191	19	3
1926	335	18	11
1927	185	4	5
1928	272	18	0
1929	234	16	6
1930	244	16	4
1931	318	9	4

Essex Commercial Fruit Show.—Sound methods of production and marketing are most reliably judged in a favourable balance sheet, but the attraction and value of show exhibiting make a fitting climax to the close of the growing season. The Essex Commercial Fruit Show was started four years ago and, in each successive year, has shown an increase in the number of exhibits staged. It is run by a Management Committee, consisting of representative firms and growers in the county, and is self-supporting, funds being obtained by letting space for trade stands, from advertisements in the Show Schedule, and from entry fees and the sale of admission tickets.

At present, the schedule of classes has two fruit sections for top-fruit growers, one for commercial fruit growers in the county, and a second open to small growers whose total

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acreage of fruit does not exceed five acres. The Show is, however, growing each year, and the sections will now most probably be remodelled on the lines of the Imperial Fruit Show. In addition to the competitive exhibits and trade stands, grading and packing demonstrations have been given at each show. The Show has now assumed an importance which fully justifies carrying it on for an extra day, and will doubtless require a larger site than hitherto.

Future of Fruit Growing in Essex.—It was stated at the beginning of this article that there was ample room for expansion in the fruit-growing industry. According to the Ministry of Agriculture returns, this country produced on an average, over eight years, approximately 11 million bushels of apples, and imports amount to 18 million bushels, of which 10 million bushels are produced in the United States. Proximity to our markets alone gives this country a big advantage over foreign countries, and if a comparable sample is produced, expansion of apple growing is assured of a market for its produce. A demand for apples in this country has been created, and publicity has resulted in an increase in the consumption per head of the population.

The important consideration for the future is the production in bulk of a standardized product for competition with imported produce. The development of the industry in Essex has been in this direction. New plantations, with a limited number of varieties planted in large blocks, will in a few years be supplying quantities of well-graded and well-packed fruit. Production costs will be reduced to a minimum, plantations being of an economic size. The wider adoption of the cold store will extend the season of some varieties.

It can safely be said that there is no industry in Essex that has a brighter or more assured future than fruit production.

(Concluded)

SOIL PROFILE STUDIES OF ROMNEY MARSH PASTURES

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Area.—On the south coast of Kent, between the English Channel and the range of low Wealden Hills, extending partly into Sussex, lies a tract of rich pasture land, 64,000 acres in extent, the whole of which is locally called Romney Marsh, though the scotted (rated) area of the region properly termed Romney Marsh consists of 24,388 acres only.

The rated areas of the various marshes in which the author's investigations were carried out are given below:—

(1) Romney Marsh proper	..	..	24,388	acres
(2) New Romney Level	..	..	946	„
(3) Denge Marsh	..	..	3,960	„
(4) Walland Marsh	..	..	12,082	„
Total			41,376	„

Note.—The above figures refer only to the scotted areas and not the total areas.

Boundary.—The tract lies entirely in Kent, and the Royal Military Canal runs near its northern and western boundary, while the sea surrounds it on the south and east (Fig. 1).

Object of Investigation.—The great variation in the fertility of pastures within this region, in fact very often in different parts of the same field, has attracted the attention of many investigators in the past, and the problem has been attacked from several angles. Previously, chemical studies of soils and herbage analyses of pastures have been made, but no conclusive evidence as to the underlying factor which causes this variation in fertility has been established.

The object of the writer's investigation was, therefore, to see if a pedological study of pastures would throw any light on this wide range of variation in fertility. The suitability of the Marsh for such an investigation is exceptional, as certain soil factors remain constant throughout the region and the effect of the remaining factors which vary can therefore be studied with tolerable accuracy.

The following factors were investigated:—(1) Stock, (2) Climate, (3) Management, (4) Topography, (5) Drainage, (6) Water table, (7) Soil.

SOIL PROFILES ON ROMNEY MARSH

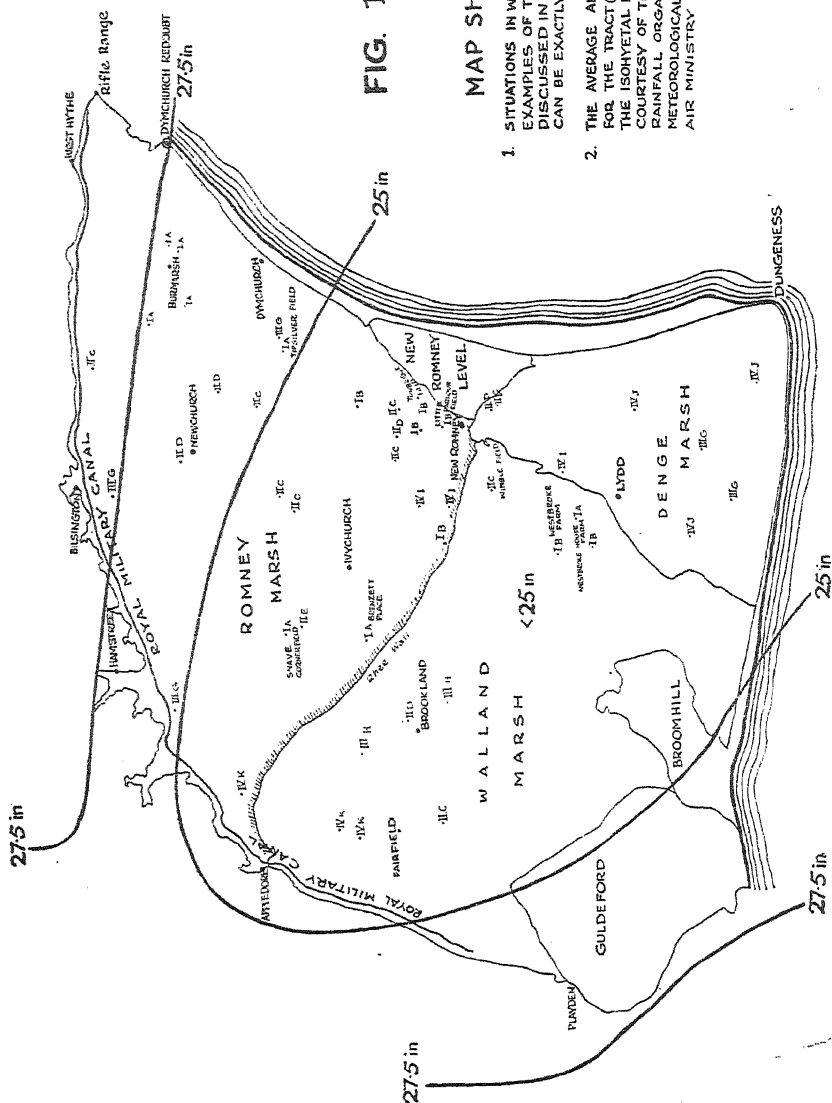


FIG. 1

MAP SHOWING

1. SITUATIONS IN WHICH TYPICAL EXAMPLES OF THE SOILS DISCUSSED IN THIS PAPER CAN BE EXACTLY LOCATED.
2. THE AVERAGE ANNUAL RAINFALL FOR THE TRACT (1881-1915). THE ISOHYETAL LINES ARE BY COURTESY OF THE BRITISH RAINFALL ORGANIZATION, METEOROLOGICAL OFFICE, AIR MINISTRY

SOIL PROFILES ON ROMNEY MARSH

Stock, Climate (Fig. 1) and Management were found to be fairly constant. Bad management of pastures, however, brings about rapid deterioration in soil profile, just as good management, over a long period, improves soil fertility by improving the water circulation of the soil.

Topography, drainage and water table were found to be inter-connected and to produce a profound effect on the soils of the region. Thus a pasture even a foot higher or lower than its surroundings differed in fertility from its neighbours. The reason is that the water from surrounding fields is drained into the low-lying area, and this circumstance creates anærobic conditions, permits growth of weeds and brings about the deposition of compounds of iron and aluminium, with the result that deterioration in soil profile takes place and pasture fertility is adversely affected.

The lowest, therefore the least fertile, areas in the Marsh, are Appledore Dowels and parts of Snargate and Fairfield parishes, while the higher areas of Burmarsh, New Romney and Ivychurch, are more fertile.

In the region under study, the variations in the height of the water table, due to changes in topography and sub-surface geology, are local and produce appreciable effects on soil profile. The water table stands at two levels, one in summer and one in winter, except near the sea coast where the water table varies with the rise and fall of the tide. The presence of iron compounds in definite horizons and at definite depths is an index of the influence of water table conditions.

Soil Formation.—The mineral matter in almost all the Marsh soils is of alluvial origin and ultimately derived from the rocks of the Hastings Beds, Weald Clay and Lower Greensand; but materials from Beachy Head and the coast-line generally have been brought by the sea. As the area consists almost entirely of alluvium, its original materials are hardly recognizable, except at the foot of the Wealden Hills, in the shingle on the coast, and in certain other places, where former elevated surfaces have been eroded and levelled by the action of sea and river. Even on the shore the outcrop of Hastings Beds is covered by several feet of alluvium.

By whom, or how long ago, Romney Marsh proper was recovered from the sea, there is no record to show. It has been suggested that the tract has, in comparatively recent

SOIL PROFILES ON ROMNEY MARSH

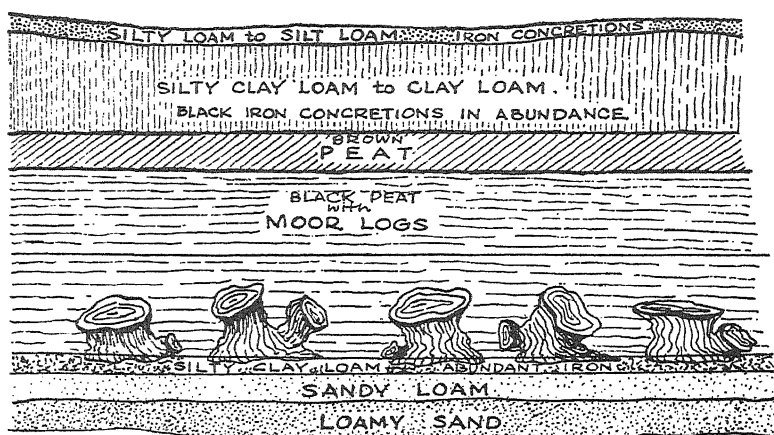


FIG. 2.—Soil Section at Woodruffs, Fairfield Parish, Walland Marsh, from a diagram lent by Mr. C. Stokes.

times, in Pleistocene and Neolithic days, been subject to many and profound changes. It has undergone uplifts and subsidences, and has been alternately sea and grassland or woodland. The presence of moorlogs at Appledore Dowels is evidence of subsidence, for this is an area now $13\frac{1}{2}$ ft. below the highwater mark of spring tides, showing that the land must have been, at one time, at a higher level than at present to permit the growth of forest trees; while the underlying sea sand (showing that before the growth of the forest the region was actually covered by sea) means that an uplift took place at a still earlier time (Fig. 2). As a result of these alternations, the tract has been radically altered in form, elevations have been eroded and hollows have been filled in.

During the recession of the sea, the bay of the River Rother continually changed its form under the influence of tides and local currents, forming a succession of lagoons and alluvial flats, each one to be swept away and succeeded by another, until the hand of nature, by the formation of a graded shore profile, and of man, by the building of sea-walls, arrested the process.

The activity of the rivers has affected soil formation in a number of ways—by changing their courses, by eroding the land, by frequency of flooding and by such variation in velocity that the deposition of different kinds of sediments has occurred. The sea has also had a modifying influence

SOIL PROFILES ON ROMNEY MARSH

on soil formation by bringing in sand and by removing soil materials. It is therefore clear that great variation in the soil of the Marsh is bound to occur.

The great fertility of much of the soil is partly explained by the fact that the deposits of raw materials for soil formation were themselves very rich. According to the analyses of Phillips, the suspended material in the water of the channel consists of fifty-two parts of sand, twenty-four parts of calcareous solids, traces of iron oxides, and twenty-four parts of organic matter. Phillips states that half-an-inch of this material was deposited on the top of the stonework at Rye Sluice on a still day by a single tide.

Results of Investigation.—Hall and Russell in their classical investigation of the Agriculture and Soils of Kent, Surrey and Sussex (1911) say (p. 59): "The amount of stock the more famous fields of the Marsh will carry and fatten is incredible, and these rich fields are sometimes only separated by a ditch or a fence from others that will do no more than keep the sheep on them in a growing condition," but add (p. 65): "the mechanical analyses of the Marsh soils . . . fail to throw any light on the superiority of one field over its neighbour." As for the herbage study, the same writers say (p. 60): "there is but little in the botanical composition of the two herbages to account for their great difference in feeding value." W. Davies (1928), in his Report to the Pasture Sub-Committee,* says that the average of superior species of grasses decreases with decrease in the fertility of pastures, but this statement gives no clue as to the underlying factor which brings about such a result. In the present pedological investigation, the author has been able to establish eight new soil series and investigated fully the one (Finn Series), established by Brade-Birks and Furneaux. Each of these series has definite characteristics and a well-defined economic range of soil fertility.

I. The Finn Series (Fig. 3).—Texture range of soil type: loam to silty-loam. The chief characteristics of this series are:—

- (1) 10 in. to 20 in. brown loam to silty-loam followed by 12 in. to 16 in. silt-loam with orange mottlings, then by 4 in. to 6 in. of silty-clay-loam, containing a slight deposit of iron compounds. This is followed by sandy-loam which becomes lighter in texture

* This JOURNAL, Vol. XXXIX, No. 1 (April, 1932), p. 26.

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with depth. The change into sandy-loam is often abrupt; where the silty-clay-loam horizon does not appear in the profile, the depth of the silt-loam horizon is much greater, which evidently compensates for the absence of heavier material.

- (2) No horizon of the soil is heavier than silty-clay-loam.
- (3) The soil is very well drained and is the only soil in the Marsh that easily draws up water in summer to maintain a vigorous grass growth.
- (4) The soil is alkaline in reaction, the alkalinity increasing with depth.

The best and most famous fattening pastures in the Marsh are found on this series.

II. The New Romney Series.—Texture range of soil type: very fine sandy loam to loam. The chief characteristics of this series are:—

- (1) 15 in. to 30 in. brown very fine sandy-loam to loam, followed by 10 in. to 15 in. fine sandy-loam to silty-loam, then by coarse sandy-loam which becomes progressively lighter in texture and passes into loamy-sand.
- (2) No horizon is heavier than silty-loam.
- (3) All horizons of this series, if taken in their natural order, are lighter than the corresponding ones of the Finn Series.
- (4) The reaction of the top horizon is variable, being usually acid, but occasionally neutral and rarely alkaline.
- (5) The drainage is very good; but the pastures are apt to "burn" in a dry summer.

Very good fattening pastures, only slightly inferior to those occurring on the Finn Series, are found on this series, but only where the top horizon is very deep.

III. The Brenzett Series.—Texture range of soil type: silt-loam. The chief characteristics of this series are:—

- (1) 6 in. to 10 in. brown silt-loam followed by 10 in. to 12 in. lighter-brown silt-loam containing white calcareous concretions, then by 10 in. to 12 in. dark-brown, silty-clay-loam with much iron staining. Below this is heavily iron-stained and mottled bluish-grey silt-loam.
- (2) The soil texture becomes progressively heavier to a depth of 3 ft., below which it begins to be lighter.
- (3) The lowest horizon is a silty-loam with a pronounced blue colour.
- (4) Peat invariably occurs in this series at a depth of 6 to 9 ft., and influences the colour and drainage of soil several feet above it.
- (5) The reaction of the top horizon is alkaline, but that of the peat and of the horizon immediately above is acid.
- (6) The drainage is moderately impeded.

Only breeding pastures, carrying 4 to 6 sheep per acre in summer, occur on this series.

IV. The Ivychurch Series (Fig. 4).—Texture range of soil type: silt-loam to silty clay-loam. The chief characteristics of this series are:—

- (1) 10 in. to 12 in. dark-brown silt-loam to silty clay-loam, slightly iron-stained, becoming paler with depth and containing white concretions below 10 in. This is followed by 8 in. to 10 in. of heavily iron-stained, greyish-brown and mottled silt-loam, then by 10 in. of clay-loam containing iron concretions and, finally, by sandy-loam.



FIG. 3.—Finn Series. A drainage cutting at West Hythe showing soil horization and the depth of the water-table.

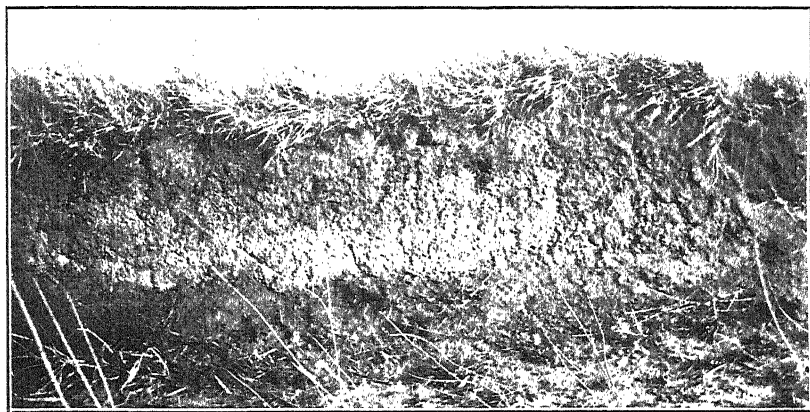


FIG. 4.—Ivychurch Series. Soil section showing soil structure and iron accumulation in the lower part.

SOIL PROFILE STUDIES OF ROMNEY MARSH PASTURES.

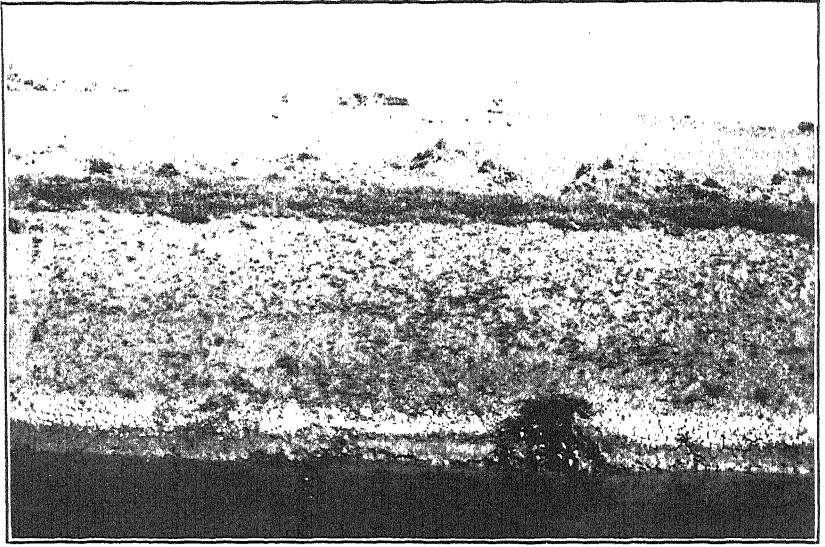


FIG. 5.—Newchurch Series. A drainage cutting at West Hythe showing the uniform soil, cracking badly in the lower part.

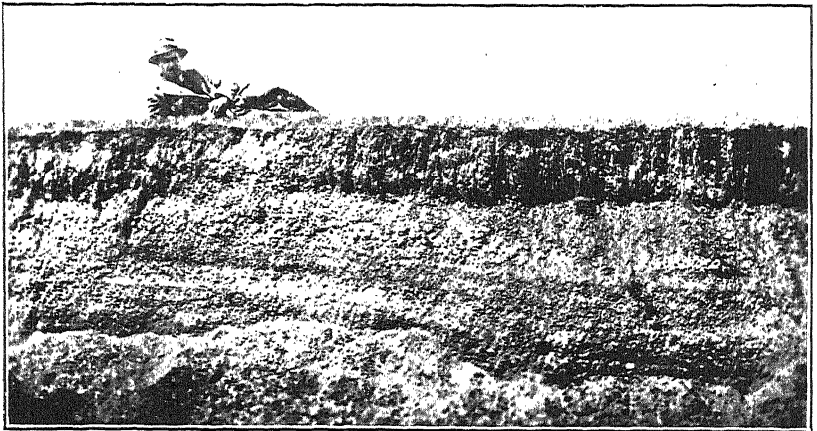


FIG. 6.—Lydd Series. Showing shingle covered with a shallow, sandy soil.

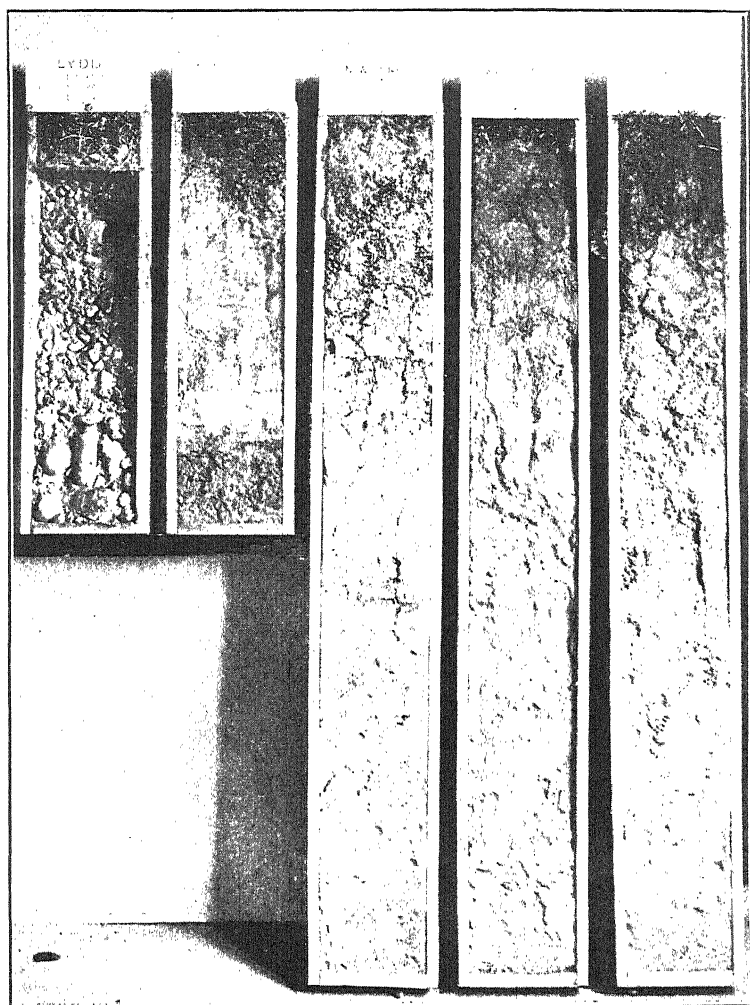


FIG. 8.—Monoliths of the more important soil series. These monoliths were taken on the spot and show exactly the soils of various series as they exist *in situ*. Left to right: Lydd; Appledore; Newchurch; New Romney; Finn.

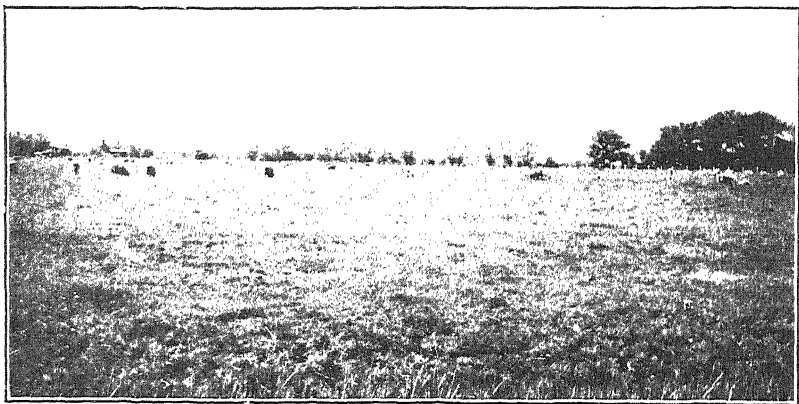


FIG. 9.—A first-grade fattening pasture, regarded as being the best in the Marsh: Mr. Arthur Reeve's seventeen-acre field at Sueve Corner.



FIG. 10.—A poor, rushy pasture, separated only by a road from the fattening pasture shown in Fig. 9, and belonging to the same grazier.

SOIL PROFILES ON ROMNEY MARSH

- (2) An iron and clay pan which occurs at $2\frac{1}{2}$ ft. to 3 ft. becomes extremely hard in dry weather and prevents the upward movement of water.
- (3) The soil cracks moderately in summer.
- (4) The reaction is alkaline.
- (5) The drainage is slightly impeded.

Only breeding pastures, carrying 4 to 6 sheep per acre in summer, occur on this series.

V. The Hurst Series.—Texture range of soil type: silty-loam to silt-loam. The chief characteristics of this series are:—

- (1) 6 in. to 8 in. brown, silty-loam to silt-loam, followed by 6 in. to 9 in. lighter-brown, slightly-stained silt-loam, then by 10 in. to 15 in. yellowish-brown silty clay-loam, with bluish-grey streaks and black concretions. Below this is yellow clay-loam with abundant black concretions and mottling.
- (2) The gradation of soil horizons becomes progressively heavier, until the heaviest known horizon is reached at the bottom.
- (3) The drainage in the heavier horizons is definitely impeded.
- (4) The reaction is variable.

Only breeding pastures, carrying 2 to 5 sheep per acre in summer, are found on this series.

VI. The Newchurch Series (Fig. 5).—Texture range of soil type: silt-loam. The chief characteristics of this series are:—

- (1) 8 in. to 10 in. brown silt-loam followed by a uniform blue-mottled clay-loam with abundant brown iron-oxide streaks to a depth of several feet.
- (2) Unlike other series, the underlying material is heavy throughout and of one texture.
- (3) The drainage is impeded.
- (4) The reaction is alkaline.
- (5) The soil cracks badly.

Only breeding pastures, carrying 3 to 5 sheep per acre in summer, occur on this series, the fertility depending on the height of the water table.

VII. The Denge Series.—Texture range of soil type: silt-loam to silty clay-loam. The chief characteristics of this series are:—

- (1) 6 in to 8 in. brown silt-loam to silty clay-loam, followed by very heavy clay-loam with an abundance of black concretions.
- (2) In essential respects this series closely resembles the Newchurch Series except that the depth of the top horizon is less than in the Newchurch Series, the soil is slightly heavier and the drainage much more impeded.
- (3) The reaction is alkaline.

It produces only breeding pastures of rather poor quality.

VIII. The Appledore Series.—Texture range of soil type: silt-loam to clay-loam. The chief characteristics of this series are:—

- (1) 5 in to 7 in. brown silt-loam to clay-loam, followed by 10 in. to 15 in. of blue clay-loam with brown mottlings and black concretions. This is followed by peat.

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- (2) The textures of various horizons depend upon the proximity of the peat to the surface.
- (3) The percentage of undecomposed organic matter is high.
- (4) The reaction is variable.
- (5) The drainage is poor.
- (6) The Appledore Series may for all practical purposes be regarded as compressed Brenzett Series.

It produces only rough grazing land, the number of sheep varying from 1 to 2 per acre in summer.

IX. The Lydd Series (Fig. 6).—Texture range of soil type: very fine sandy-loam to fine sandy-loam. The chief characteristics of this series are:—

- (1) 0 in. to 8 in. brown, very-fine sandy-loam to fine sandy-loam. Below this is shingle.
- (2) If shingle occurs within 2 feet of the surface, the soil is regarded as a shallow phase.
- (3) The reaction is acid.
- (4) The drainage is excessive, causing the pastures to dry up in summer.

It produces only rough grazing land carrying up to one sheep per acre in summer. In case of a deep phase, it carries more. If the soil is very thin it is incapable of carrying any sheep at all in summer.

The more important soil series are diagrammatically represented in Fig. 7 and a photograph of boxed monoliths, taken from pits, appears in Fig. 8.

Classification of the Marsh Pastures on a Soil Profile Basis.—As a result of these investigations, the writer has devised a classification of the Marsh pastures based on soil profile only, and this, from an economic point of view, has been correlated with their carrying capacity.

Grade I (Fatting Land).—Pastures belonging to this grade fatten from 6 to 10 sheep per acre in summer and occur on one or the other of the two following series:—

- (1) The Finn Series IA.*
- (2) The New Romney Series IB.

Certain very famous pastures in the Marsh (Figs. 9 and 10) are said to fatten as many as 12 sheep per acre but, in these instances, the top horizon has been found to be of exceptional depth. The management, including manuring in certain cases, has also helped to produce their phenomenal performance. Pastures fattening not more than 6 sheep per acre are occasionally found on soils in which the top horizon is as heavy as silt loam, but in all such instances the water table is high and drainage good. These

* The lettering here adopted is that employed on the map (Fig. 1) and indicates grade and performance.

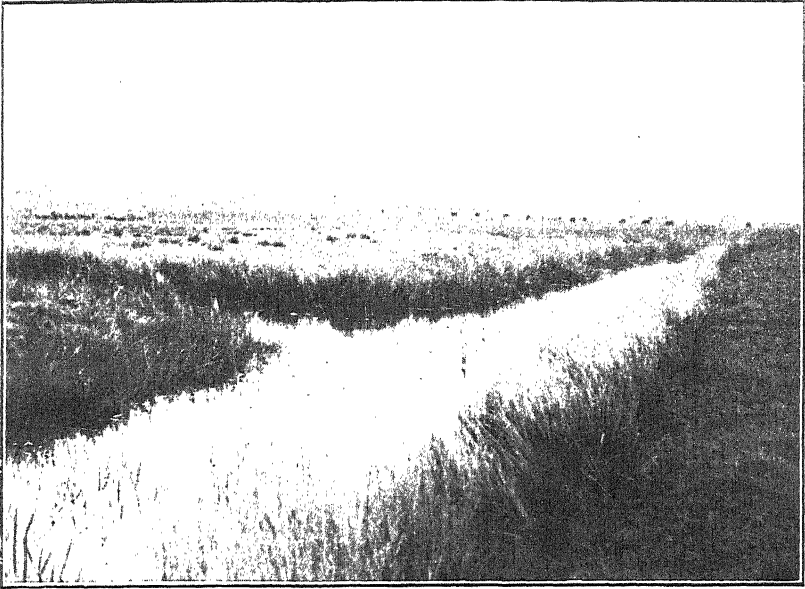


FIG. 11.—A poor pasture on Appledore Dowels (Appledore Series), showing a very high water-table and excessive growth of rushes.

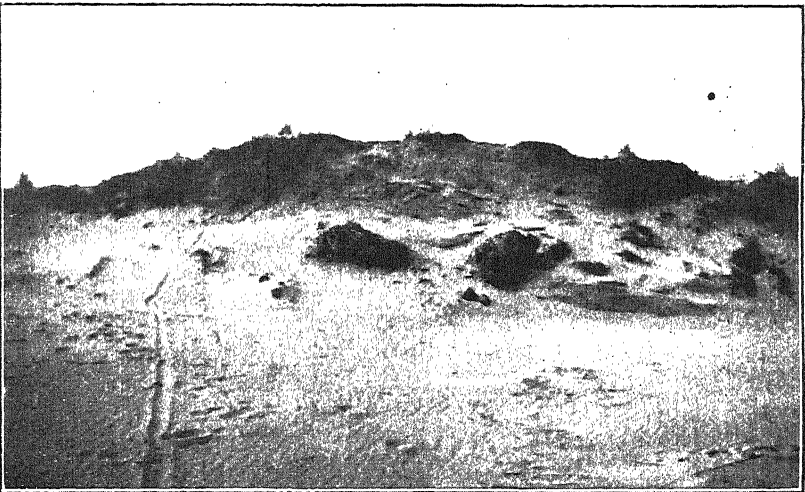


FIG. 12.—Blown sand showing wind ripples. Sand dunes at Littlestone.

SOIL PROFILE STUDIES OF ROMNEY MARSH PASTURES.

SOIL PROFILES ON ROMNEY MARSH

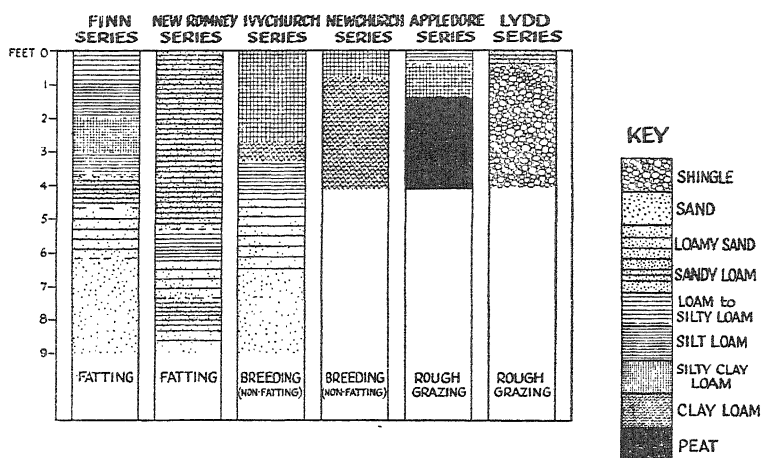


FIG. 7.—The more important soil series diagrammatically compared.

two outstandingly good soil series, however, produce fattening pastures only when their typical depth is maintained, and it is always found that the fertility of fields is directly proportional to the depth of the top horizon. The greater the depth of the top horizon the more fertile is the pasture. On the shallow phases of the series excellent breeding pastures are found.

Grade II (Breeding Land).—This grade keeps from 4 to 6 sheep per acre in growing condition in summer. The soils belong to one or other of the five soil series :—

- (1) Newchurch Series IIc.
- (2) Ivychurch Series IIb.
- (3) Brenzett Series IIb.
- (4) New Romney Series IIe.
- (5) Hurst Series IIc.

The drainage of each of the above series, except New Romney, is slightly impeded and the maximum number of sheep are carried only where the top horizon is fairly deep.

Grade III (Breeding Land).—This grade carries from 2 to 4 sheep per acre in summer and occurs on one or other of the five soil series :—

- (1) Denge Series IIIG.
- (2) Hurst Series IIIG.
- (3) New Romney Series—shallow phase IIIf.
- (4) Lydd Series—deep phase IIIf.
- (5) Appledore Series—deep phase IIIG.

The soils of this grade are either poorly drained or excessively drained.

Grade IV (Rough Grazing Land).—This grade carries two or fewer sheep per acre in summer and occurs on one

SOIL PROFILES ON ROMNEY MARSH

or the other of the two soil series (Fig. 11):—

(1) Lydd Series—Shallow phase IVj.

(2) Appledore Series—Shallow phase IVk.

It also occurs on blown sand, for which no series name has been given (Fig. 12).

The fertility of the pastures in the last grade is largely governed by drainage. Thus, pastures on the Lydd Series give better performance in winter than those on the Appledore Series, owing to the flooding of the latter at this time. The reverse obtains in the summer.

Conclusions.—(1) Other conditions remaining the same, pasture fertility in the area under investigation varies directly with the depth of the top horizon of the soil.

(2) The heavier the texture of the top horizon the less fertile is the pasture.

(3) The texture of the top horizon remaining the same, pasture fertility is adversely affected by the heaviness of lower horizons, especially the lowest.

(4) The texture of the soil remaining the same, pasture fertility is governed by the height of the water table.

(5) Presence of black concretions in the topmost horizon indicates bad drainage. It is usually associated with water logging and growth of rushes.

(6) Soil reaction (pH value) gives an indication of lime requirement.

(7) Climate, management and drainage also affect pasture fertility and should be duly investigated in a pedological study.

ACKNOWLEDGMENTS.—The writer wishes to offer his sincere thanks to the Rev. Dr. S. Graham Brade-Birks and Principal R. M. Wilson, of Wye College, for their advice and interest; and to the Marsh graziers for their co-operation, which has made this investigation possible.

BRITISH BREEDS OF MILCH GOATS

S. LEIGH HUNT,

Ministry of Agriculture and Fisheries.

THE number of pure-bred goats in the United Kingdom at the present time must be very small, no importation from abroad having been permitted by the Ministry since 1922, when, at the instance of the British Goat Society, 28 Saanens were introduced from Holland and 17 Toggenburgs from Switzerland. The Society's Herd Book* contains sections for both these breeds, but true representatives of other Swiss and Oriental varieties are extremely rare. It scarcely needs to be pointed out that good milking qualities are more a matter of strain than of breed; in fact, for utility purposes cross-breds are usually superior to pure stock. Goat-keepers will find it useful, however, to acquaint themselves with the distinctive characteristics and features of the more important types now kept in this country.

The English Goat.—It is doubtful if any truly "wild" goats survive in the British Isles, although in a number of localities individuals and herds exist under wild conditions.

An "English" section is provided in the Herd Book, the condition of entry being: "When the goat itself, and its sire and dam, grandsires and granddams, are entered in the Probationers' Record," or "When both sire and dam are entered in the English section of the Herd Book." Another regulation requires that "Goats before being entered in the Probationers' Record of the English section of the Herd Book, shall be inspected by two or more recognized Judges present at the same time, who shall report as to the suitability or otherwise of the goats inspected. No kid under the age of six months can be inspected."

The official points of the breed are as follows: "Head neat and tapering towards the muzzle. Facial line, if not straight, slightly concave, not convex. Neck, preferably free from tassels. Horns, if any, set well apart, wide at base and branching out towards the points. Ears small, varying between erect and horizontal, without any tendency to break or to hang downwards. Beard of moderate size to be a recognized feature, but beardless not objected to. Coat thick, short or of medium length. Fringe along back and thick tufts at the hindquarters are

* Obtainable from the Secretary, British Goat Society, Roydon Road, Diss, Norfolk, price 2s. post free.

BRITISH BREEDS OF MILCH GOATS

admissible but undesirable. Legs short. All shades of 'colour' are recognized," ranging from black to white, a common type being fawn, with the spine and lower limbs dark.

Up to the present the English goat has not proved as profitable as other breeds, and can hardly be relied upon to yield a good, regular supply of milk.

The Anglo-Nubian.—This is the name now given to a mixture of the English or other breeds with Oriental lop-eared goats of Nubian, Egyptian, Abyssinian, Chitral or similar Indian extraction. As early as 1859, the variety was recorded under the term "Syrian," subsequent names being "English and Indian" and "English and Abyssinian." The Anglo-Nubian has long ceased to be regarded as a cross-breed, many British specimens having pedigrees that date back to the beginning of the present century. No pure Nubian has been imported since the purchase of "Sedgemere Sanger" by Mr. S. Woodiwiss in 1903, but the question of a fresh importation, in order to maintain the Eastern characteristics of this interesting variety, is under consideration.

A goat is only entered in the Anglo-Nubian section "When both sire and dam are entered in this section," or "When one parent is so entered, and the other is entered in the Nubian section," or "When three of its grandparents are so entered and the fourth does not in its pedigree show any pure foreign blood (other than Nubian) for at least three generations," or "When one parent is entered in this section, and the other has been entered in the Anglo-Nubian Probationers' Record."

The milk of the Anglo-Nubian is rich, containing as a rule more butter-fat than that of the Swiss breeds, although the yield is not usually so abundant. During recent years, however, marked improvement has been made in yield.

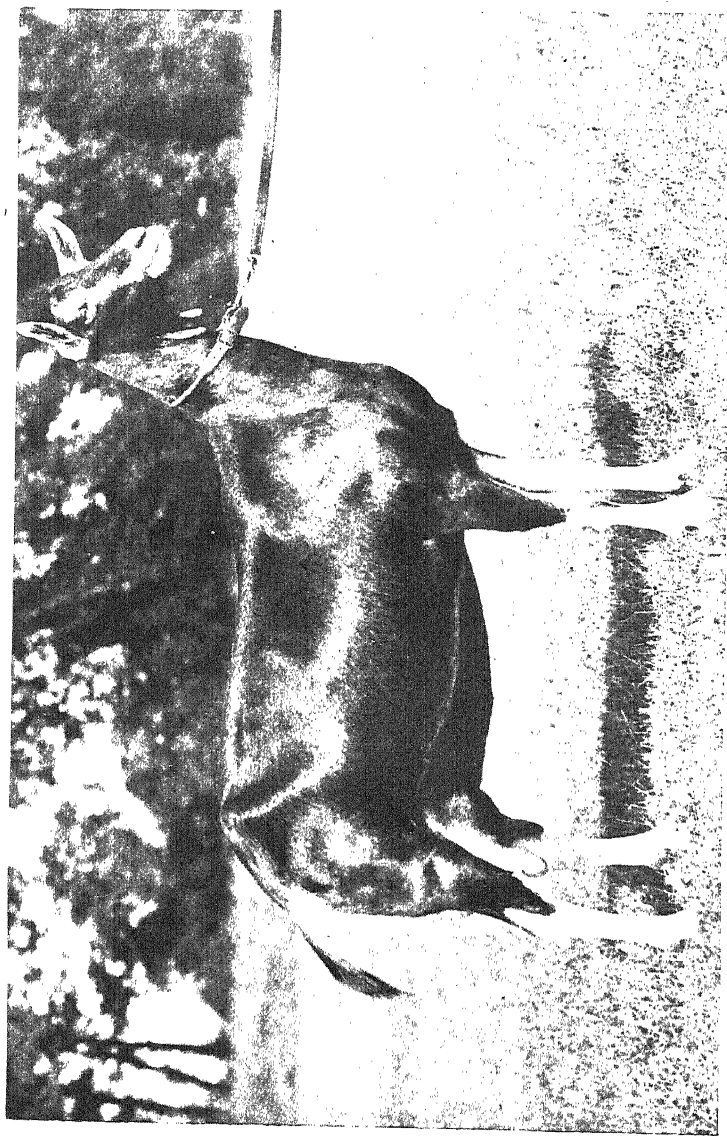
The Anglo-Nubian is not necessarily horned, but when it is so adorned its horns are small and curve distinctly downwards and outwards. The coat is short throughout, with no fringe of long hair on the back or long tufts on the flanks. The ears must be long, wide and pendulous or semi-pendulous, but not broken or twisted. The facial line should be plainly arched, the head neat, with a slight taper towards the muzzle, which is small, and in the female without beard. The eye should be large and full, and forehead wide. The breed presents a wide range of colour,



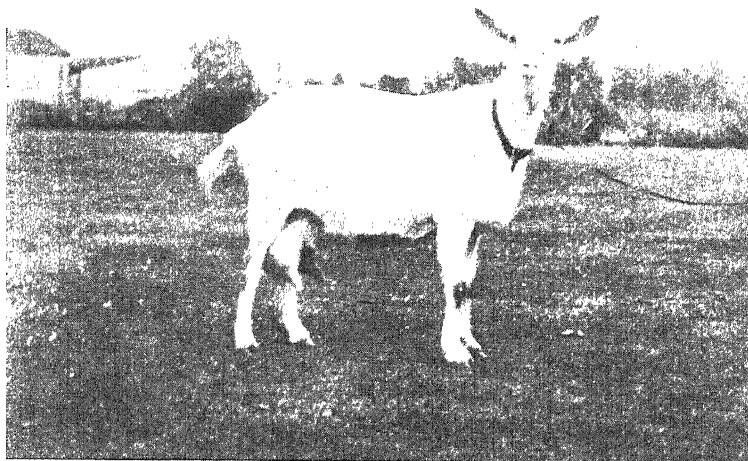
The Anglo-Nubian.

BRITISH BREEDS OF MILCH GOATS.

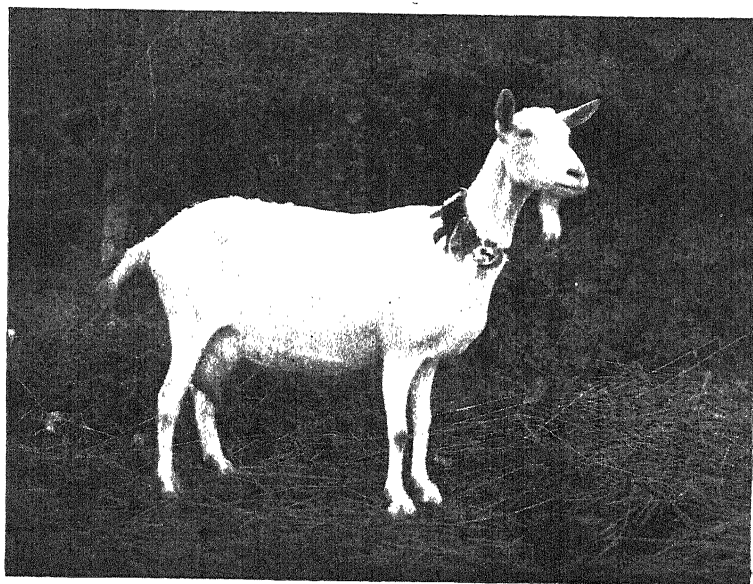
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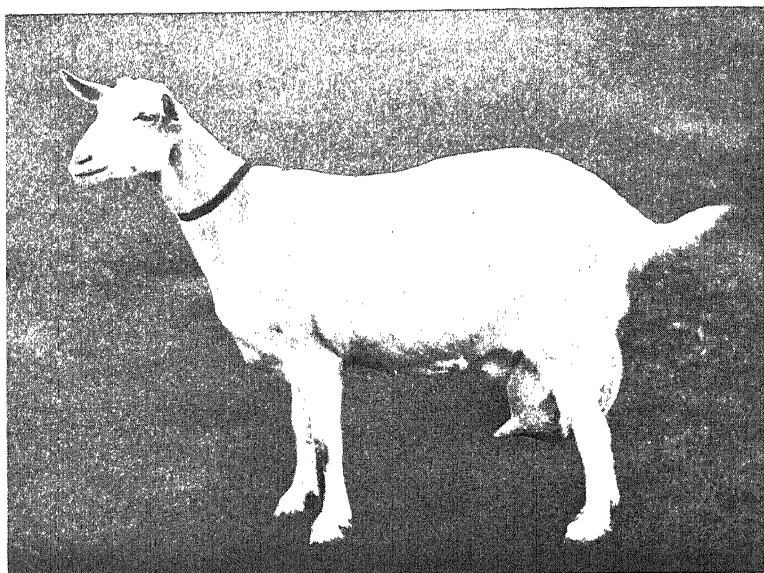
The British Alpine.



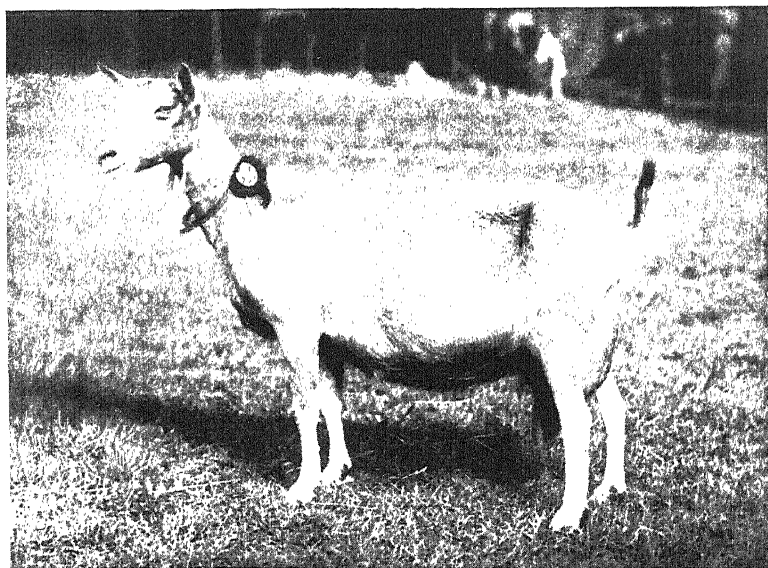
The Saanen.



The British Saanen.



The British.



The Toggenburg.

[NOTE.—For the loan of the illustrations in this inset, the Ministry is indebted to the British Goat Society.]

BRITISH BREEDS OF MILCH GOATS

embracing cream, white, black, tan and even spotted specimens. The last named are preferred by some. Anglo-Nubians, having one or more white streaks on the side of the face, are not unknown.

The British Alpine.—The term “Alpine” is applied to the common native goat of Switzerland, existing in great variety throughout the Alpine range. At the Paris Show of 1903, entries bearing this designation gained a reputation as the best milkers present, and in the same year specimens of the breed were imported into this country.

The Herd Book gives the following general description of the British Alpine: “Essentially a ‘Swiss’ in appearance, and might be described as a black Toggenburg. The same objections in the way of foreign characteristics which would tell against the pure Toggenburg would be equally applicable to this variety.”

The official points are: “A long, lean head, with or without beard, horned or hornless. Facial line straight and muzzle somewhat coarse, as in the Toggenburg and the Saanen. Ears erect or pointing forward; neck long and slender, with or without the tassel-like appendages common to the Swiss. The body colour must be black, with or without white on the belly, together with two white or light-fawn stripes along the face, white or light-fawn on legs from knees and hocks downwards, and white or light-fawn at the rump and on or about the tail—a little white or light-fawn about the cheeks or under the neck is permissible. White or light-fawn patches on the body or forehead are not permissible, whilst goats with dark-fawn, brown or tan markings are not acceptable. White markings are preferred. The coat should be short throughout, but there may be a ridge of longer hair along the back, and a thicker growth at the hindquarters.”

The British Alpine is usually quiet and tractable, and can be commended for its milking qualities.

The British Saanen.—Two importations of Saanens have been made in recent years, viz., 1903 and 1922, and their descendants “without any admixture of other blood,” form the Saanen section of the Herd Book. The British Saanen is a distinct improvement on the imported animal, being usually larger, with a shorter, sleeker coat, longer legs, and more graceful lines. As a rule, it yields more and better milk than its cousins in the Canton of Berne.

Entries are made in this section of the Herd Book

BRITISH BREEDS OF MILCH GOATS

“ When both parents are entered in this section,” or “ When one parent is entered in this section and the other parent is entered in the Saanen section,” or “ When three grandparents are entered in this section and the fourth is entered in the Saanen section,” or “ When two grandparents, one on the side of the sire and one on the side of the dam are entered in this section, and the other two are entered in the Saanen section.”

The points of a British Saanen are thus defined:—“ A long head, facial line straight with coarse muzzle, with or without beard, horned or hornless. Ears erect or pointing slightly forward but never broken or pendant; neck long and slender, with or without tassel-like appendages. Colour, white, pale cream or very pale biscuit is accepted. Black skin spots are allowed. (Goats with black spots on the hair should not be accepted.) White goats are preferred. Coat should be short, with or without a fringe down the back and down the hindquarters.”

The British Toggenburg.—The original Toggenburg is said to be the result of a cross between the Appenzell, from the Swiss canton of that name, and the Chamoisée, an old-established mountain race, so called on account of its resemblance, chiefly in colour, to the chamois. Toggenburgs have long been bred in Britain, and used for crossing with native stock. “ An imported goat recognized by the Society as pure Toggenburg, or the descendants of such imported stock, without any admixture of other blood ” is eligible for entry in the Toggenburg section of the Herd Book. Fresh blood was introduced in 1922, but breeders generally prefer the outcross to the thoroughbred animal. The British Toggenburg is certainly an improvement on its foreign forbear, being usually larger, more refined in the muzzle, shorter coated and a better milker. In the matter of colour more licence is allowed to this breed than to the British Saanen, but whatever the shade, it must be a “ self-colour,” and a brown-roan is not acceptable. Typical specimens are hornless, but it sometimes happens that kids bearing horns are thrown by well-bred animals. Normally two kids are produced every year, but on occasion there may be triplets and quadruplets.

The Herd Book describes the breed as “ essentially ‘ Swiss ’ in appearance,” and adds: “ The same objections in the way of foreign characteristics which would tell against a pure Toggenburg—with the exception of colour

BRITISH BREEDS OF MILCH GOATS

—would be equally applicable to this variety.”

The recognized points are:—“ A long, lean head, with or without beard, and with or without horns. Facial line straight and muzzle somewhat coarse. Ears erect or pointing forward, but never broken or pendant. Neck long and slender, with or without tassel-like appendages. Colour may be anything from light-drab to dark-chocolate, with or without white on the belly, together with two white or light-fawn stripes along the face, white or light-fawn on legs from knees and hocks downwards, and white or light-fawn at the rump, and on or about the tail—a little white about the cheeks, or under the neck is permissible. White patches on the body or forehead are not permissible, whilst goats with dark-fawn, brown or tan markings are not acceptable. White markings are preferred.”

The British Goat.—To the types, described above, must be added that most numerous of all classes which at shows receives the general appellation of “ any other variety,” and in fact frequently inherits features and characteristics of one or more of the foregoing breeds. This is due to the circumstance that British goat-keepers breed mainly for milk and, in order to increase the yield, mate their nannies with Toggenburgs, Saanens and British Alpines. The resultant progeny show the chief “ Swiss ” characteristics in varying degrees, although naturally they do not conform to any of the definitions of recognized types. Formerly these cross-bred goats were entered in the “ General ” section of the Herd Book and known as “ Anglo-Nubian-Swiss.” The title, however, was felt to be cumbersome and misleading, and quite unsuited to a type that owes its origin to the skill and perseverance of British breeders. All these goats are of one family, although of various colours, and since 1928 they have been classified in the Herd Book as “ British ” Goats.

The following table shows the highest recorded milk yields for one year, of various breeds kept in this country:—

<i>Breed.</i>	<i>lb.</i>	<i>oz.</i>	<i>Breed.</i>	<i>lb.</i>	<i>oz.</i>
British	5,050	15	British Toggenburg	3,063	13
Saanen (1926-7) ..	4,464	—	Toggenburg	3,012	5
British Saanen (1927-8)	4,343	11	Anglo-Nubian	2,234	4
British Alpine	4,067	2	English	1,539	8

The recorded year in question was 1929-30, except for the two breeds otherwise specified. The highest recorded yield for 24 hours during the year 1929-30 was that of a British Alpine which gave 21 lb. 6 oz.

HORTICULTURAL CROP-WEATHER OBSERVATIONS IN 1932

T. N. HOBLYN, Hort. Dip. (Wye),
East Malling Research Station.

IN presenting a summary of the precision records obtained, in 1932, on the apple trees planted at stations participating in the Ministry's Agricultural Meteorological Scheme, it is necessary first to give some explanation of the objects in view in collecting these data.

Observations on the growth, blossoming and fruiting of these trees have been made for a number of years, the age of the trees, in 1932, being eight or nine years. It has, however, been apparent for some time that these records were not sufficiently precise for accurate conclusions to be drawn from them. It was therefore determined to limit the rather wide range of these observations and concentrate upon a single problem, and to obtain information upon that problem as precise as the parallel meteorological observations.

Having regard to the available material, the time of blossoming of apple trees and its relation to fruit-set and fruit-drop seemed a suitable problem about which accurate information could be collected.

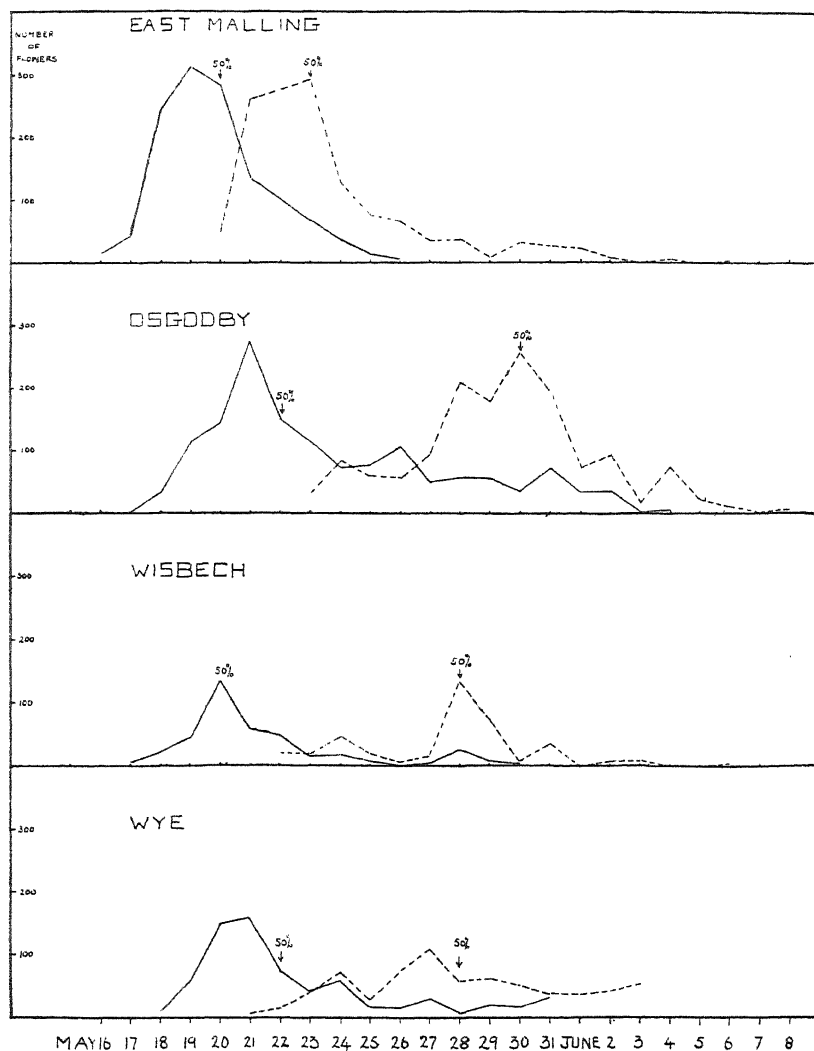
The trees available at each station, were four each of two varieties, Bramley's Seedling and Worcester Pearmain, with one exception, on the same type rootstock. In this experimental year the observations were limited to Bramley's Seedling.

Time of Blossoming.—In 1931 Irwin* described a method for the precise determination of time of blossoming, of which he had made trial in the year 1930, and the method adopted was based on his observations.

Previously, the only precise flowering dates recorded were those on which the first blossom opened and the last fell; the date by which half the blossoms appeared to have opened was also recorded, but no accurate counts were obtained. Under the new scheme, four sample branches of definite length were selected at random on each tree; and daily counts were made of the number of individual flowers open on those branches, and of the number fallen, throughout the season. Of the stations participating, four were

* Irwin, J. O. Precision Records in Hertfordshire: Part II. *Jour. Pomol. and Hort. Sci.*, 9 (1931), pp. 169-194.

HORTICULTURAL CROP-WEATHER OBSERVATIONS



Frequency distributions of opening and fall of blossoms of Bramley's Seedling apples at four Stations in 1932.

Note.—The continuous line indicates the actual number of blossoms open on each day; the dotted line, the actual number of blossoms fallen on each day.

HORTICULTURAL CROP-WEATHER OBSERVATIONS

able to carry out these daily counts, while a fifth made similar counts of blossom trusses. Three other stations were not able to do the daily counts, but tested the accuracy of the old method by a single count of all blossoms, unopened, open and fallen, on the day on which the observer estimated that half had opened. One other station had unfortunately no blossom on their trees to count.

The extra information obtained by the new observations is shown in the diagram (p. 147), wherein are shown the frequency distributions of blossoms, open and fallen, at the four stations that were able to carry out the full programme. The black line shows the actual number of blossoms open, and the dotted line the number fallen, on each day throughout the season. For each curve the median, or day on which half the flowers had opened or fallen is indicated. It will be noted that, owing to skew nature of the curves, this point is usually a day or two after that on which the greatest number opened.

It will be readily realized that the information obtained is of a much more intimate character. Not only was the day by which half the blossoms had opened precisely determined, but also the length of that much more important period, between the 50 per cent. open and the 50 per cent. fallen dates, when the majority of the flowers were in full bloom.

The diagram shows that, in 1932, all four stations reached the 50 per cent. open point within a day or so of one another; but whereas at East Malling half the blossoms had fallen within a period of three days, at Osgodby this period lasted eight days, thus giving a much greater chance for inclement weather conditions to become important, or on the other hand, for insect visitors to assist pollination. The whole period of blossoming was approximately the same at the two stations.

Fruit Set and Drop.—Having made these accurate blossom counts, it became a comparatively easy matter to estimate fruit set and drop. Four days after the last flower dropped its petals, a count was made of the number of flowers which had apparently set fruit on the marked samples. Thereafter, at fortnightly intervals up to the time of harvesting, counts were made of the number of fruits on the sample branches. By this means it was hoped to obtain

HORTICULTURAL CROP-WEATHER OBSERVATIONS

reliable information as to the effect of the weather upon the actual proportion of blossoms which set fruit, and to fix more definitely the period known among fruit growers as the "June drop."

Eight stations carried out these fortnightly counts throughout the season, and the year's records are summarized in three tables. In Table I, the number of blossoms and fruits observed at each station are compared. In Table II, the important dates in the season are summarized. All the trees were sprayed for scab at the "Mouse-ear" and "Pink-bud" stages. The dates when these were applied give an indication of the rapidity of development before blossoming.

TABLE I.—BRAMLEY'S SEEDLING, 1932. NUMBER OF BLOSSOMS AND FRUITS.

	Average Number of Blossoms per tree (4 samples).	Average apparently set 4 days after blossoming (4 samples).	Average No. of Fruit picked on 4 samples.
Gulval	*370	67	19
East Malling	332	78	20
Houghall	0	0	0
Long Ashton	475	39	12
Osgodby	365	92	7
Perdiswell	26	19	2 [†]
Wisbech	98	27	10
Wisley [†]	712	198	39 [§]
Wye	227	180	14

* Estimated from number of trusses.

[†] Lost after 2/9/32.

[†] Trees on Broadleaf No. I.

[§] Fruit not actually picked.

The important dates during blossoming are also given in Table II, these being illustrated in more detail for four stations as previously described in Fig. 1. In the final column, the date on which the fruit was picked is added.

Table III illustrates the drop of fruit, showing the percentage of the fruits (which had apparently set four days after blossoming had finished) that fell in successive fortnights from that date. It is noteworthy that, with one exception, a very large proportion fell during the first fortnight. It would seem, therefore, that an additional count after the first week would be of great interest. The observer at Long Ashton records that gales and birds were largely responsible for the comparatively heavy fall later in the season, at that station.

HORTICULTURAL CROP-WEATHER OBSERVATIONS

TABLE II.—BRAMLEY'S SEEDLING, 1932. IMPORTANT DATES.

	Lime Sulphur Spraying.		Blossoming.				Frosts during Blossoming.*	Fruit Picked.
	Mouse Ear Stage.	Pink Bud.	1st Blossom open.	50 per cent. open.	50 per cent. fallen.	All fallen.		
Gulval	Feb. 26	Mar. 31	Apr. 20	May 1	May 13	May 31	May 7	Sept. 15
East Malling	Apr. 22	May 14	May 16	May 20	May 23	June 6	—	Oct. 4
Honghall	Apr. 27	May 26	No Blossom	—	—	—	—	—
Osgodby	Apr. 5	May 8	May 17	May 22	May 30	June 8	—	Oct. 3
Long Ashton	Apr. 27	May 14	May 15	May 23†	—	June 13	—	Oct. 24
Pardiswell	May 3	May 18	May 24	—†	—	June 6	—	—
Wisbech	May 9	May 17	May 17	May 20	May 28	June 6	—	Sept. 13
Wisley	—	—	May 17	May 19§	—	June 4	—	—
Wye	Apr. 16	May 18	May 18	May 22	May 28	June 3	—	—

* Affecting the flowers.

† 60 per cent. open.

‡ 100 per cent. open 31/5/32.

§ 47 per cent. open.

TABLE III.—FRUIT SET AND DROP.

Fruit Set.	% Drop.									Picked. Per-centage	Date of Picking.
	1st fort-night.	2nd fort-night.	3rd fort-night.	4th fort-night.	5th fort-night.	6th fort-night.	7th fort-night.	8th fort-night.	9th fort-night.		
Gulval	100	41.2	9.0	8.6	6.4	4.9	1.1	—	—	28.1	Sept. 15
East Malling	100	47.6	11.3	4.2	2.9	4.5	1.6	1.3	—	26.0	Oct. 4
Long Ashton	100	20.0	7.7	4.5	0.6	2.6	3.9	7.7	8.4	31.1	Oct. 24
Osgodby	100	84.5	3.3	1.1	0.3	1.9	0	0	—	8.1	Oct. 3
Pardiswell	100	85.3	5.3	0	0	0	—	—	—	9.3	Sept. 2*
Wisbech	100	43.0	11.2	0.9	0	1.9	0	—	—	38.3	Sept. 13
Wisley	100	64.7	6.4	1.0	0.3	0.2	0.2	0.9	2.1	19.8	Oct. 12
Wye	100	66.0	16.5	2.8	2.2	—	—	—	—	7.8	Aug. 16

* Fruit lost after this date.

MARKETING NOTES

No statistical analysis of the data here presented is to be attempted at the moment: it is hoped to accumulate information over a period of years before a full analysis is undertaken. The scheme is to be extended this year to include the variety Worcester Pearmain, and ten stations have promised to co-operate. It is hoped that, although the objects of the experiment are somewhat restricted, the data collected will be really reliable and as precise as the meteorological data with which they are to be compared.

MARKETING NOTES

National Mark Beef.—The numbers of sides (including quarters and pieces expressed in terms of sides) of beef graded and marked with the National Mark during January, February and March, 1932 and 1933, and the three weeks ended April 22, 1933, were as follows:—

LONDON AREA.

<i>Period.</i>	<i>London.</i>	<i>Birkenhead.</i>	<i>Scotland*.</i>	<i>Total London Supplies.</i>
January 1932 ..	7,761	2,300	5,690	15,751
„ 1933 ..	7,915	3,066	5,020	16,001
February 1932 ..	7,883	2,688	5,732	16,303
„ 1933 ..	6,231	1,755	4,678	12,664
March 1932 ..	7,814	1,504	5,913	15,231
„ 1933 ..	6,383	2,357	5,150	13,890
Three weeks ended April 22, 1933 ..	3,865	1,501	3,675	9,041

* Figures include Scotch sides graded and marked in London.

BIRMINGHAM AND YORKSHIRE AREAS.

<i>Period.</i>	<i>Birmingham.</i>	<i>Leeds.</i>	<i>Bradford.</i>	<i>Halifax.</i>
January 1932 ..	3,574	1,939	1,707	508
„ 1933 ..	5,172	2,396	1,906	440
February 1932 ..	3,807	2,026	2,022	568
„ 1933 ..	4,363	1,868	1,418	327
March 1932 ..	3,918	1,943	1,626	429
„ 1933 ..	4,510	1,850	1,581	373
Three weeks ended April 22, 1933 ..	2,745	1,329	1,111	223

The decrease in the number of home-killed sides graded and marked during February and March was mainly due to a decrease in the number of cattle slaughtered, although the proportion of sides graded to the total “dressed” in the Birmingham Abattoir actually increased by 10 per cent. in February as compared with the previous month. The decrease in the London Area is attributable to a diminution in the proportion of gradable cattle killed at Islington Abattoir, and to a falling-off in the number of cattle killed

MARKETING NOTES

in private slaughterhouses and co-operative societies' abattoirs. All the supplies of home-killed beef of gradable quality in the principal abattoirs in the London area are still being graded under the National Mark.

National Mark Wheat Flour.—From time to time, representations have been made to the Ministry that the National Mark Wheat Flour Scheme should be extended to enable the National Mark to be used in connexion with biscuits. The matter was fully discussed on February 2, 1933, at a conference between a sub-committee of the National Mark Wheat Flour Trade Committee and representatives of the National Association of Biscuit Manufacturers.

The biscuit manufacturers stated that for various reasons the direct application of the National Mark to biscuits was not favoured. Their main objections were the necessity for using a proportion of flour from imported wheats in certain types of biscuits and the relatively small proportion, in money value, of flour in high-grade biscuits. They approved, however, the suggested inclusion in the National Mark Scheme of patent and other grades of flour suitable for biscuit manufacture and undertook to recommend their use. Revised grades for All-English (Wholemeal), All-English (Straights), All-English (Patents), All-English (Seconds) and All-English (Self-Raising) flours which would meet biscuit manufacturers' requirements, were agreed upon. A notice has accordingly been published in the *London Gazette* of the Minister's intention to make new regulations embodying these grades, in substitution for the Agricultural Produce (Grading and Marking) (Wheat Flour) Regulations, 1929. It is intended that the new regulations shall take effect as from July 1 next.

National Mark Fruit.—National Mark schemes for gooseberries, loganberries, raspberries, red currants and black currants have been agreed with the National Mark Fruit Trade Committee and the National Farmers' Union, and draft regulations prescribing grade designations and statutory definitions for these fruits have been published. Copies of illustrated Marketing Leaflets describing the schemes may be obtained, free, on application to the Ministry.

In addition to the standard labels for packages of tomatoes, cucumbers, apples, plums and strawberries, labels

MARKETING NOTES

in the form of discs are now available to authorized packers who use private brand labels or suitably branded containers. All types of National Mark labels for fruit and vegetables may now be obtained directly from the Ministry.

The scheme providing for the registration of wholesale distributors who are prepared to deal in fruit and vegetables packed under the National Mark, is being widely adopted, and already over 100 firms have been granted certificates of appointment as registered distributors.

National Mark Vegetables.—Three grades have been decided upon for asparagus to be marketed under the proposed National Mark Scheme. These are *Extra Selected*, *Selected* and *Choice*, and they will be applicable to both the green and white varieties. Details of the National Mark Scheme for asparagus, which has been prepared in consultation with leading growers and distributors, are contained in Marketing Leaflet No. 42, copies of which may be obtained, free, on application to the Ministry.

Supplies of National Mark cauliflower and broccoli have been meeting a ready demand on the principal markets, and one of the leading salesmen in Birmingham reports that National Mark grades have realized from 1s. to 1s. 6d. more than unmarked packs. At the Western Commercial Show, held at Penzance on March 16 and 17, a special competitive class for National Mark broccoli attracted six entries, which were all of a high standard. The winner of this class also gained the Runciman Cup for the best crate of broccoli in the Show. Forty-five packers have now been enrolled in the scheme.

Twelve packers of cabbage lettuce, including an important growers' association, have been authorized in the new National Mark Scheme for this vegetable. Glasshouse lettuce packed under the National Mark has already appeared in Covent Garden Market.

Proposed National Mark Scheme for Cheshire Cheese.—The following Resolution has been passed unanimously by the Milk and Dairy Produce Committee of the National Farmers' Union, and endorsed by the Council of the Union:—

"This Committee requests that immediate steps should be taken to secure the application of the National Mark Scheme to Cheshire cheese, and as soon as practicable to other suitable types of home-produced cheese."

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The Cheshire Cheese Federation has also agreed in principle to the application of the National Mark to Cheshire cheese. The preparation of a National Mark Scheme is now under consideration by the Ministry.

Marketing Demonstrations.—The Ministry's programme of marketing demonstrations will open with the Bath and West Show at Wimbledon, May 24-27. The main feature of the Ministry's pavilion will be the National Mark Hall, containing exhibits illustrating all the National Mark products in season. The new National Mark Schemes for asparagus, bunched carrots and gooseberries will be demonstrated and a working demonstration of the grading and packing of eggs under the National Mark Scheme will also be given. The Ministry's National Mark films will be shown continuously.

Other Shows to be visited in May are the Huntingdonshire Show, at Ramsey, on May 25, and the Royal Counties Show, Bournemouth, May 31 to June 3. The National Mark Asparagus Scheme will also be demonstrated at the Asparagus Show, Evesham, on May 25.

Displays of National Mark and other Home Produce.—The Empire Marketing Board have taken premises in Western Road, Brighton, for temporary use as an Empire shop similar to those which have been opened in other large towns. The first fortnight, commencing on May 15, will be devoted to the produce of the home country, and the Ministry will be responsible for the display and sale of samples of National Mark and other home produce.

Misuse of Statutory Grade Designations for Eggs.—Instances have come to the notice of the Ministry of Agriculture and Fisheries in which statutory grade designations have been used in connexion with the sale of eggs that fall short of the grade requirements as regards weight. The most common misuse of the grade designations is the sale as "Standards" of eggs of a minimum weight of $1\frac{7}{8}$ oz., instead of a minimum weight of 2 oz.

The Ministry has accordingly taken steps to bring to the notice of all concerned the obligations attaching to the use of the statutory grade designations.

Wheat Act, 1932.—Wheat certificates lodged with the Wheat Commission up to and including April 14, 1933, covered 16,470,223 cwt. of millable wheat of the 1932 crop,

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the average selling price per cwt. (on farm) being 5s. 4d. The total sales up to July 31 next have been estimated for the purposes of the Wheat Act at 19,800,000 cwt.

The Commission announce that cases have come to their notice in which a farming branch of a society or firm has disposed of its wheat to the milling or grocery branch of the same society or firm and has obtained a wheat certificate in respect of that wheat. There have also been instances where it is probable that an individual registered grower has disposed of wheat of his own growing to a mill which is in his own ownership.

The Commission wish it to be known that, in their opinion, such transfers of wheat which involve no change in the ownership of the wheat do not constitute sales for the purposes of the Wheat Act. The Commission will, therefore, not be able to recognize as valid in future a wheat certificate issued in respect of such a transaction. The position, will, of course, be the same where any individual registered grower disposes of wheat of his own growing to a mill or other business in his personal ownership.

Schemes for Regulating the Marketing of Pigs and Bacon.—The public inquiries into objections lodged against these two schemes were concluded on April 5 and the report of the Commissioner is now under consideration. If the Minister and the Secretary of State for Scotland are satisfied that the schemes, either with or without modification, will conduce to the more efficient production and marketing of the regulated products, drafts of the schemes will be laid before Parliament during the present month for approval. In the meantime, the provisional marketing boards to be set up under the schemes have been proceeding with their preliminary arrangements. Negotiations between them regarding the contract prices for bacon pigs during the initial contract period have been successfully concluded.

Union of South Africa: Meat Trade Control.—The further legislation foreshadowed on the passing of the Meat Trade Control Act, 1932 (see this JOURNAL, October, 1932, p. 667), has taken form in the Livestock and Meat Industries Bill, 1933, recently introduced by the Union Minister of Agriculture. The Bill proposes to repeal the 1932 Act and to set up a new Board of thirteen members (possibly fourteen) to supersede that of three members constituted under the earlier legislation. The new Board will be more

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representative than the old: in addition to the Chairman, there are to be three official members (acting *ex officio* and having no vote), four (possibly five) representatives of stock farmers, and representatives of pedigree cattle breeders, meat exporters, wholesale butchers, retail butchers and live stock auctioneers.

In addition to the powers possessed by the existing Board, it is proposed that the new body shall have power, with the consent of the Minister, to impose a levy on all cattle and sheep slaughtered at any slaughter place, and to pay from the levy-fund a bounty or premium on beef or mutton or slaughter-cattle exported from the Union.

Moreover, the measure may be applied to other classes of slaughter-animals, and if pigs should be brought within its scope and become subject to a levy, a representative of the pig farmers would be added to the Board. The levy-fund may also be used in the betterment of the live stock and meat industries generally.

The Bill contains chapters covering cattle improvement (the establishment of areas in which only registered bulls may be kept, and the sterilization of inferior animals); the regulation and control of cold-store premises and slaughter places; and the control of the meat trade generally. Live stock may be required to be sold by live weight and local authorities to provide weighing apparatus.

The Governor-General may by proclamation limit the numbers of slaughter-stock or quantities of meat that may be moved into or from an area and the numbers of slaughter-stock that may be offered for sale in any market. He may also proclaim the maximum prices at which meat may be sold, except by auction. The Bill also includes clauses enabling official action to be taken at any time if it is considered that the relations between different parties in the industry are such as to be detrimental to the best interests of the industry, or if trade is being restricted, or if prices of stock or meat are being unduly influenced.

Denmark : Regulation of Pig Production.—The system of regulation of bacon imports into the United Kingdom, which has recently been instituted, has made it essential for the Danish bacon industry to reduce its output. The importation of bacon from Denmark is at present limited by agreement to rather less than 500,000 cwt. per month—the equivalent of about 105,000 pigs per week. The normal home consumption is estimated at from 15,000 to 20,000

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pigs per week. Any pigs in excess of 120,000 to 125,000 per week must, therefore, find other markets. Killings have recently been in the neighbourhood of 150,000 pigs per week.

As a result of pressure from the associations representing co-operative and private bacon factories, supported by the Agricultural Council, the Danish Parliament has passed legislation which empowers the Minister of Agriculture, with the consent of the Agricultural Council, to take measures aimed at limiting production. The powers provided by the Act include that of fixing two price-levels for pigs, one for pigs up to a definite number per month, the other—and lower—for pigs in excess of that number. The higher price will be paid only in respect of the number of pigs estimated to be required for export to the United Kingdom and for normal home consumption. It will be based on the price obtained for bacon in this country. For all other pigs, the price will be related to prices obtained in other outlets.

The slaughter of pigs of over 110 lb. weight, with the exception of sows and boars, will be prohibited except in export slaughterhouses—i.e., bacon factories—and in municipalities where veterinary control of meat is exercised. For each four-weekly period, a number of cards will be issued to all producers supplying bacon factories and controlled slaughter-houses, which will entitle them to payment for a definite number of pigs at the higher rate. Information is not available as to the basis on which these cards will be allotted. For pigs delivered without cards, the lower price will be paid. Presumably, producers supplying uncontrolled slaughterhouses will also be paid at the lower rate.

Except in so far as they are able to produce profitably at the lower price, Danish pig feeders will thus be compelled by economic pressure to reduce their pig output to the number represented by the cards allotted to them. On the other hand, each producer will be able to reckon on the "export price" for a certain number of pigs; those who fail to reduce their output to meet the new circumstances will pay the penalty themselves, instead of depressing the market for everyone, as would be the case in the absence of the proposed price-differentiation.

The Act also provides for a levy on all pigs delivered, to create a fund for stimulating the demand for pork and to cover the expenses of the scheme.

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Norway: Organization of the Pig Industry.—A note in this JOURNAL for June, 1931 (p. 296), mentioned the Marketing Council set up in Norway for promoting the marketing of various agricultural products, and also the system of raising funds for this purpose by levies on sales. It also stated that a producers' commodity board, the Norges Fleskesentral, was being formed. It is now possible to give a fuller account of the constitution and work of this body.*

The Norges Fleskesentral was established and began operations in April, 1932; it is now one of the largest producers' organizations in Norway, and elects one member to the Marketing Council. The Central is constituted as a co-operative company, with varying membership, varying capital and limited liability. Its main objects are to encourage the production of good quality pork and bacon, and to market the finished products at home or abroad on behalf of its members. At the decision of the Annual Meeting, the Fleskesentral may also undertake the marketing of other meats.

The Fleskesentral includes both corporate and individual members. Co-operative slaughterhouses and sales societies concerned mainly with the marketing of meat are eligible for corporate membership. The eight co-operative slaughterhouses in Norway and 132 of the sales societies are now members. Altogether, over 90,000 pig producers, or about 85 per cent. of the total in the country, are covered by the scheme of the Fleskesentral.

Upon enrolment, each individual member pays an entrance fee. This is levied at a rate of 50 öre (about 6½d.) per animal on the average number of pigs over four months old which the member has kept during the past year. No member may withdraw until the end of the first five years of the Fleskesentral's existence. Thereafter, members may withdraw at the end of any year, but six months' notice is required. Disputes between the Fleskesentral and its members are subject to compulsory arbitration.

The Central is governed by a board of seven members, from among whom an executive committee of three is elected to collaborate with the manager in the conduct of business.

The initial capital of the Fleskesentral consisted partly of bank loans and partly of the funds created by the dues levied on pig carcasses under the authority of the Marketing Council, before the Fleskesentral commenced operations. Its income is derived from the commission which it charges on sales and from the current levies on pig carcasses raised by the Marketing Council, which are passed on to

* It may be interesting to compare the purposes and methods of operation of this body with those of the Dutch Pig Central, described in this JOURNAL, November, 1932, pp. 761-2.

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the Central. At present, these levies amount to about 1s. 8d. per whole carcass of more than 33 lb. weight, and 10d. for smaller carcasses and parts of carcasses.

The Central confines its marketing operations to sales for export and on the Oslo market, and does not attempt to sell in other parts of Norway. Probably about 40 per cent. of the total marketed output is sold in Oslo; the actual quantity in 1932 was 143,400 carcasses. Members are bound by the rules to consign all pig carcasses intended for sale in Oslo or for export to the Fleskesentral. Upon receipt at the Oslo meat market, the carcasses are graded according to the rules laid down by the Board, and at least once a week minimum selling prices for each weight grade are fixed by a price committee, consisting of the executive committee and a representative of an important slaughtering concern. The weight grades are as follows:—I, 110-165 lb.; II, 165-187 lb.; III, 187-231 lb.; IV, 231-286 lb.; V, over 286 lb. Premiums are payable in respect of various quality points, such as proportion of fat.

Members are paid for the pork and bacon which they send to the Central at the prices obtained by the latter, less expenses. The Central employs salesmen at a fixed salary to sell the pork and bacon in the Oslo meat market. The actual cost of selling amounts to about 1 per cent. of the selling price. A small commission of $\frac{1}{2}$ per cent. is added to cover administrative costs. This commission may have to be increased to 1 per cent. but, even so, the total selling charge will compare favourably with the charge of commission agents, which is normally from $2\frac{1}{2}$ to 3 per cent.

At the end of the first nine months of its operations, the Central was selling from 55 to 60 per cent. of the pig-meat supplied to Oslo. This is a smaller proportion than had been hoped for, or than had been guaranteed under the supply contracts, but the proportion of the total sales handled by the Central has recently tended to increase. Breaches of supply contracts have been dealt with in accordance with the Fleskesentral's rules, which provide for an initial warning, a monetary fine for a second offence, and expulsion for a third offence.

Two new export bacon factories are available for the use of the Central at Oslo and Stavanger, but exports, in 1932, were negligible owing to short supplies. Short-period price fluctuations were reduced by retaining supplies in cold-store and by some salting of pork. It is claimed that, in spite of very unsettled conditions in the market for other meats during 1932, prices for pig-meat were more stable than ever before and were slightly higher, on the average, than in 1931. It is feared that as a result there may be an undue increase in production. Propaganda against this is being undertaken by the Central; and the possibility of some direct form of control over production is also contemplated.

MAY ON THE FARM

WILLIAM LAWSON, M.B.E., N.D.A., N.D.D.,
Director of Agriculture for West Sussex.

Root Crops.—The main activity on arable land is the preparation of the land for roots and the sowing of the seed. The season has been rather erratic in the southern counties; heavy rains fell in the autumn and rather curtailed preparation at that period. A good spell of frost in mid-winter more than made up for the drawbacks experienced earlier, and in spite of wet spells in spring there have been many favourable opportunities to prepare a good tilth during late March and early April.

In some districts considerable areas of mangolds and sugar-beet are sown in April, but in the southern counties May is considered a better seeding time. Where the area of roots is considerable, past practice has been to distribute the work of preparing the land and seeding the crop by growing different crops; under such a system mangolds were sown first, followed by swedes and turnips, so that hoeing and singling were distributed over a fairly long period. Now that sugar-beet is replacing the former crops in districts within reach of a factory, such a wide distribution is not so generally possible. Experience, however, has indicated that sugar-beet may be expected to grow successfully in southern counties if sown at any time between mid-April and late May.

In some seasons the early-sown crop may excel, but germination and early growth are sometimes delayed by adverse weather conditions. When sowing is done exceptionally early it is wise to use a more liberal amount of seed, and this is particularly true of sugar-beet where a regular close plant is necessary to ensure a full crop.

As soon as the rows of seedlings can be seen the horse-hoe should be set to work—and with a heavy seeding this may be possible several days before the rows could be followed after a thin seeding. If germination is irregular a light roller may be passed over the crop with advantage.

Early horse-hoeing also stimulates growth by breaking the crust that so frequently forms on a good tilth at seeding time, and by destroying weeds while still in their seedling stage.

Singling of sugar-beet should be done early, especially where a thick seeding has grown successfully; unless a thick

growth is tackled at a comparatively early stage the work soon becomes difficult and expensive. If there is danger of the plants becoming too big before singling can be completed, bunching may be done first: but whilst this is an advantage to the subsequent growth and prevents the young plants from becoming spindly, singling has ultimately to be done and the total cost of the work is increased.

Growers of marrow-stem kale should make several sowings; the early-sown crop will provide early autumn feed, while the later sowings will stand the winter better and provide good green forage in the south up to late March.

Bare Fallow.—The general practice of bare fallowing serves the double purpose of improving the physical condition and reducing weeds. Soils of a heavy or clayey type are the usual subjects for a complete bare fallow; lighter soils lend themselves to cleaning operations that can be satisfactorily completed in time for the sowing of a crop of roots that will lead to inter-row cultivation and further weed destruction.

Improvement of the physical character of clay soils demands rather special treatment. Early winter cultivation is limited, so that a more or less solid furrow is available during the early summer months. A late winter ploughing followed by a cross ploughing now should leave the soil in big blocks. The aim is to get these blocks or clods well dried out by sun and wind.

Weathering is an all-important factor, and unless the soil becomes dried out and all weed growth is in abeyance before the end of June, then the fallow on these lines has failed, and other measures must be adopted to prevent the last state of the land becoming worse than the first. If the growth of weeds cannot be stayed by dry warm weather the cultivators must be set to work and the weeds destroyed, and, although the full physical benefit to a heavy soil is not secured, the weed destruction part may be accomplished.

On light or medium soils "baking" is not necessary, and indeed may do harm. Weed destruction is the primary consideration and, to this end, the ground should be freely cultivated from the harvest of one crop to the seeding of another.

Weeding of Cereal Crops.—Judging from the appearance of some corn fields at harvest the practice of digging docks and spudding thistles has slackened off in recent

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years. Docks are a real nuisance; their strong fleshy roots will withstand long periods of drying and yet remain alive, and nothing short of removal and burning can be recommended. Docks also produce an abundant supply of seed that ripens with the cereal crop and either falls out on the land or is carried with the crop, and may ultimately find its way to the manure heap unless great care is taken during threshing to destroy the seed weeds separated by the machine. In a cereal crop hand-digging is the only remedy, and although the work is expensive it is well worth while if matters are not to become much worse.

Spudding of creeping thistles should not be done too early, or fresh growths will develop into seeding plants before harvest. Spread of these thistles, however, is largely dependent upon the root system, and if fair growth is allowed before the first cutting or spudding is done the creeping roots will be drawn on to produce a second growth and if this in turn is cut off at harvest before it reaches the flowering stage the roots will be further weakened. In temporary pastures much can be done to eradicate thistles by repeated cutting throughout the summer and autumn; fields neglected in this respect often produce an undue amount of thistles when brought under the plough.

Live Stock.—Cattle that have been wintered outside make rapid progress at this time and derive great benefit from the fresh grass. Some farmers may have doubted the wisdom of out-wintering, especially where the fields are badly poached, but will now be reassured by the quick change that the early grass produces.

Cattle that have been wintered in stalls or yards require to be acclimatized to outside conditions and the big change in the nature of the food; such cattle are usually thin in their coat and not used to much exercise, and the change from even an open-fronted hovel to the open field should be effected gradually and not too early. The older the cattle are, the sooner they may be turned out. Young calves should be very carefully looked after if a severe setback in condition or even illness is to be avoided; they may get a little run out each day, the period being gradually lengthened as the animals become accustomed to the new conditions and the fresh grass. Cattle should not be turned out

hungry; concentrated food should be continued for a time and fed in the morning.

Conclusion.—With this issue the writer concludes his contributions to this series for the last three years. During that period agriculture has experienced a most trying time; falling prices do not give encouragement to fuller production, but every effort has to be concentrated on reducing costs.

The economic situation has always been in mind; every endeavour has been made to supply information, from season to season, on practical work that would be useful and still economic. Stress has often been laid on thorough cultivation of arable land and higher quality of stock, and whilst changes in the use of land or the kind of stock kept have to be made to meet the changed economic conditions, slackness in cultivation or any falling off in the quality of live stock are not means that can be recommended as a way out.

Farmers have at their disposal the knowledge and material to add considerably to the output of produce, and it is true to say that the potential productive capacity of the industry was never greater than it is to-day, in spite of the very great depletion of capital that has taken place in recent years.

[NOTE.—*The Ministry desires to express its cordial appreciation of Mr. William Lawson's valued services as the writer of these monthly notes "On the Farm" during the past three years. With the present issue, Mr. Lawson relinquishes the preparation of these articles, which, from the next (June) number onwards, will be contributed by Mr. H. G. Robinson, M.Sc., of the Midland Agricultural College, Sutton Bonington.*]

NOTES ON MANURES

H. V. GARNER, M.A., B.Sc.,
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Factory Lime—Sugar-beet lime sludge, or factory lime as it is sometimes called, is a useful source of chalk for acid soils in the immediate neighbourhood of the sugar factories. In the process of purifying the juice extracted from the beet slices, large quantities of quicklime are used; this ultimately reappears as waste carbonate of lime and is pumped into lagoons to settle out and drain. Its composition varies greatly according to the amount of water present, but the carbonate of lime is the main constituent of agricultural value, although small amounts of organic matter and phosphates are usually found in it. The quantities usually present are of the following order:—Carbonate of lime, 45 per cent.; organic matter, 6 per cent.; and phosphate of lime, 1 per cent. The remainder is largely water with a certain amount of earthy impurities.

As the dumps are exposed to the weather, the moisture content varies considerably according to the period allowed for drainage and the time of year. This is well shown by analyses conducted at Harper Adams College:—

	Percentage.	
	Chalk.	Water.
Before excess water drains away	32	50
From the dump	45	38
After drying in the field a few days ..	53	—

When the water content is above 40-45 per cent., as is usual during the campaign, the material is too moist to travel by road for it will then shake into a paste and leak from carts. The best period for removal is during dry weather in summer, when the sludge may be readily cut out of the dumps and will stand transport. A common practice at this time of the year is to cart the material straight on to "seeds" leys, hook into small heaps, spread with shovels, and harrow down the lumps. As an alternative, large heaps may be put up on the headland of the field, and the carting out and spreading left till some convenient time in winter.

Distribution is all-important in dealing with this material, and the weather is the most effective agent in breaking up the lumps. It is, therefore, best to leave it on the surface rather than to turn it under at once. If it is applied in autumn or winter and spread with shovels, it is reduced by

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frost and thaw and successive dryings and wettings. The usual cultivations break it up further and gradually incorporate it with the soil.

Factory lime contains the equivalent of about 25 per cent. of true calcium oxide (CaO), and must therefore be applied at approximately four times the rate of burnt lime. In any case, a dressing of one ton of this material would not be practicable because of the difficulty of uniform distribution. Four tons or more per acre would be a normal application. The cost at the factory is only nominal. Within the limits set by its grade and physical condition, factory lime has proved a satisfactory form of lime for the land. It is extensively used on the Continent, but is not so widely used in this country as it might be, although its value has been demonstrated from time to time. Good results are on record on the acid soils of West Suffolk, served by the Ipswich factory, sour land within the radius of the Alscott factory in Shropshire, acid fenland in the Peterborough district, and elsewhere.

In addition to the above, the factories at Felstead, Kelham and Colwick dispose of considerable quantities of sludge. Farmers who are within easy reach of a factory and know that their soils need lime, might examine the possibilities of this by-product. Sugar-beet itself is one of the crops most likely to benefit.

When the wet sludge is artificially dried at the factory, the cost is necessarily increased. The condition of the carbonate is, however, so much improved that the dried material finds a much more ready outlet than the sludge. As the dried product is more akin to ground chalk, the dressing per acre is almost halved, and it is much easier to handle. There is little doubt that the drying of this sludge is desirable, for a much larger radius could be served from a factory in this way. Thus, a recent survey showed that only about 11 per cent. of the wet material was taken by farmers, while almost the whole of the small amount of dried carbonate made at the factories was used on the land.

Summer Manuring.—In the months before harvest, there is little to be done so far as manuring is concerned. Phosphatic and potassic fertilizers applied to arable crops late in the season have little chance of coming into action. When it is applied late, nitrogen has little effect on the

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yield of cereals and tends to raise the nitrogen content of the grain. Late top-dressings to sugar-beet delay maturity. There are, however, several quite legitimate uses of fertilizers in the summer months. Crops that need a long-growing period, such as brussels sprouts, kale, and the like, are given some of their nitrogen at the time of planting; but they usually receive further nitrogen in the form of nitrochalk, or nitrate of soda in early summer. Similarly, early potatoes quite commonly receive a top-dressing of nitrate of soda as soon as the plants are well through the ridges. Aftermath seeds are freshened up by a top-dressing of quick-acting nitrogen as soon as the hay is off, and this applies more particularly to those in which the grass species predominate. First year seeds which were not manured earlier, on account of the risk of too luxuriant growth before harvest, may be top-dressed as soon as the corn is carted. Phosphate on heavy and medium soils, with potash in addition on the light soils, is the usual dressing.

There is no need to postpone dressings of basic slag until the autumn if pastures are in a condition to take the manure earlier in the season. When the grass is short, and will not be grazed for a week or two, the necessary phosphate may be applied. If warm rain follows, the manure is soon washed in, and benefit may be obtained before growth is arrested in late autumn.

A further instance of summer manuring arises when catch crops are sown in summer to make growth before the end of the season. Help from manures is particularly required on soils of rather poor natural fertility. We have no control over the weather, which is the main factor in the situation, but we can provide the ready supply of nitrogen for these crops without which rapid growth cannot take place.

Blast Furnace Slags.—Inquiries are occasionally received with regard to the agricultural value of the blast furnace slags, which accumulate in enormous quantities in iron-producing areas. These slags are, of course, quite distinct from the well-known phosphatic basic slags from steel works, and contain no phosphate. On the other hand, they contain practically the whole of the lime derived from the limestone used in the smelting process, and are worthy of notice on account of their basic properties. Genuine quicklime is not present, but there is a large amount of easily-decomposable silicates of lime and magnesia. When

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acted upon by the soil water, these silicates exert about the same neutralizing effect as an equivalent amount of limestone, and are the main constituents of agricultural value.

Some typical analyses of blast furnace slags are given below:—

		English.	American.	German.
Lime	CaO	29 — 38 }	50 — 55	{ 30 — 50
Magnesia	MgO	3.5 — 6.1 }		{ 1 — 10.5
Silica	SiO ₂	30 — 43	30 — 35	30 — 40
Alumina	Al ₂ O ₃	15 — 22	10 — 15	6 — 21
Iron	FeO	0.3 — 2.5		0.2 — 4.4
Manganese	MnO			0.2 — 15.7
Sulphides	CaS	1.9 — 2.2		0.8 — 7.5

The important figures in these analyses are those for lime and magnesia, which together reach from 40-50 per cent., or, expressed in calcium carbonate, about 80-100 per cent. Thus, there is nearly as much calcium oxide in a ton of blast furnace slag as in a ton of limestone. The availability of this lime has been examined both in Germany and the United States. When the slag is finely ground, or granulated by rapid cooling in water, the silicate of lime is readily decomposed in the soil. It is perhaps slower in action than genuine quicklime, but its final effect on the plant when used on acid soils is about the same as that of ground limestone containing the same amount of calcium oxide.

The constituents other than lime and magnesia may have agricultural value under certain conditions. After decomposition, the silicate and alumina are deposited in a jelly-like condition in the soil and this may be beneficial on coarse sandy soils which are poor in clay material. Silica when deposited in the soil in this way has also been shown to exert a favourable effect on the plant, the action being in some way connected with the uptake of phosphorus. The best instance of this is to be found in the permanent barley experiment at Rothamsted. On the other hand, the sulphides in a fresh condition are injurious to vegetation but are rapidly rendered harmless by exposure to the weather. In lime-deficient areas close to the works, powdered slag may be worth a trial as a means of improving light, acid soils. Dressings of about 2-3 tons per acre would be required. Special slags containing a high proportion (44 per cent. or more) of calcium oxide are occasionally produced. These have the additional valuable property of readily crumbling down on exposure, so that they would

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present advantages over the harder and somewhat poorer slags for which preliminary grinding would be necessary. Silicate of lime is not recognized, under the Fertilizer and Feeding Stuffs Acts, as a source of lime, so that these slags are to be regarded as waste products. They should, therefore, be obtainable at rates distinctly lower than for ground limestone of similar fineness.

PRICES OF ARTIFICIAL MANURES

Description	Average price per ton during week ended April 5				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 8 16d	£ 8 16d	£ 8 16d	£ 8 16d	s. d. 11 4
„ „ Granulated (N. 16%) ..	8 16d	8 16d	8 16d	8 16d	11 0
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 10d	6 10d	6 10d	6 10d	6 4
Calcium cyanamide (N. 20.6%)	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 10	3 5	3 2	3 7g	4 9
Potash salts (Pot. 30%) ..	5 13	5 10	5 7	5 11g	3 8
„ (Pot. 20%) ..	4 1	3 17	3 14	3 19g	3 11
Muriate of potash (Pot. 50%) ..	10 9	10 2	9 15	10 5g	4 1
Sulphate „ „ (Pot. 48%) ..	12 5	12 0	11 15	12 3g	5 1
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%)||	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	3 2	..	3 4	2 16k	3 6
„ (S.P.A. 13½%) ..	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	6 10	6 5	6 7f	6 7	..
Steamed bone-flour (N. 4½%, P.A. 27½-29½%) ..	5 15	5 2	5 2f	5 2	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 85% through standard sieve.

a Prices for 4-ton lots f.o.r.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, and for lots of 10 cwt. and under 1 ton 15s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
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Feeding of Sows and Litters.—In the March issue of this JOURNAL, the writer dealt with feeding in relation to anæmia and scour in little pigs. From the correspondence that has resulted from those "Notes," it is evident that the feeding of small pigs is a matter about which pig-keepers are seriously concerned; and rather astounding revelations have been made as to the very small average number of pigs reared per litter in various herds. We have been asked to suggest rations suitable for breeding sows and their pigs. This subject is covered in some detail in the Ministry's Bulletin No. 32,* but it may perhaps be of use to discuss rationing of sows and litters, in the light of recent experience, and the renewed interest in pig-breeding.

At the outset it is necessary to emphasize that small litter averages are by no means wholly due to improper feeding. We are, to an extent, reaping the harvest of the breeding policy of the past. Pedigree pigs have been valued almost exclusively on show performance. It is true that certain bodies concerned with pig-breeding have, in recent years, made it compulsory that the number of pigs born and reared in each litter must be reported as a necessary preliminary to the subsequent registration of pigs of those litters in the herd book. Farmers and others are becoming accustomed to figures stated thus (10—6) after the name or identification number of a pure-bred pig, in herd books and in sale catalogues. The figures mean in this case, 10 born, 6 reared. The figures are, however, only checked officially where a recording scheme may be in operation, and unless officially checked they must be accepted as of value, simply on the known character and reputation of the breeder or his responsible herdsman. It will, of course, be obvious that official checking is just as important as it is in relation to milk recording.

It is not unusual that pigs from very small litters may be the most forward and fully developed for age, and where prizes are awarded in the classes for the younger pigs, as they are in this country, largely upon weight and development for age, there has been more likelihood of the pig from a litter of say four, being exhibited than one from a litter of a dozen or more. Pigs successful in the show-

* See footnote on page 103.

NOTES ON FEEDING

yard have been largely regarded as the "best" of their breed; they have been used for breeding, and their produce esteemed because of their immediate ancestors' show successes. Consequently, many pedigree sows are irregular and unreliable breeders, and indifferent milkers. The Scandinavians tackled the improvement of milking capacity and ability to rear litters by weighing litters at 3 weeks old. Their achievement shows that it is a method that we can borrow with advantage; it is certainly the most valuable method known at present. It is necessary to realize that a good sow is one that can deliver the goods, or in other words, one that, when given a fair chance, can rear a sufficiently large and even litter of healthy, well-grown youngsters. Conformation is, of course, important, but it is not the only criterion of worth, and it is of fundamental importance that the fullest consideration should be given to udder development and the distribution of teats.

No measure of care in feeding and management can convert a really bad litter average into a good one, unless the sows have the inherent capacity, temperament, and general ability to breed and rear a reasonable number of young. Therefore, we must advise those who are in trouble with small litters not to conclude that their troubles are simply due to lack of vitamins, or insufficiency of minerals, such as calcium and iron, or to the wrong kind of protein, or the improper balance of protein in the ration. The source of the trouble may be fundamental—namely, in the strain of sows, and it will take some time and constructive breeding to develop strains that can be entirely relied upon as satisfactory breeders, but there would appear to be no insuperable difficulty about ultimately achieving the desired goal.

With about 100 farrowings yearly, the Svalöf herd can show an average of over 8 pigs reared per litter. Where this figure is obtained in this country it is considered entirely satisfactory. A common ration in use in Sweden for sows-in-milk is, parts by weight, 1 fish meal, 1 bran, 4 oatmeal, 4 barley meal, with about $1\frac{1}{2}$ gallons separated milk daily. The quantity of meal is adjusted according to the sow's yield of milk and size of litter, but may be from 10-12 lb. per day. A Scandinavian, recently visiting this country, criticized British rations as inelastic, confined too much to sharps or wheat feed. His argument was that cereals suitably ground could be used very largely to replace wheat feeds. This is true where skill and judgment are exercised

NOTES ON FEEDING

in the feeding, but it is possible that many novices will embark upon pig-keeping under the pig reconstruction scheme, and in their case it is a safe recommendation to employ a fairly large percentage of sharps, in rations for sows and little pigs. Vegetable protein, coupled with minerals, has been recommended recently by certain authorities in place of protein of animal origin. The vegetable protein has the advantage of costing less, but it is necessary to consider cost in relation to results, and, in the absence of dairy by-products, we are not satisfied that vegetable protein plus minerals can wholly replace animal protein, like fish meal, meat meal, blood meal, whale flesh meal, etc. Alternative mixtures are, parts by weight:—

- | | | |
|---|---|--|
| A | { | 1 fish meal, or other animal protein meal. |
| | 6 | sharps. |
| | 3 | barley meal or maize meal or flaked maize. |
| | { | ½ fish meal, or equivalent meal. |
| | 1 | soya-bean meal. |
| B | { | 4½ sharps. |
| | 2 | barley meal. |
| | 2 | flaked maize. |
| | { | 1 fish meal, or equivalent meal. |
| | 1 | palm-kernel cake meal, or crushed peas. |
| C | { | 4 sharps. |
| | 2 | barley meal. |
| | 2 | flaked maize. |

A mineral mixture should be fed at the rate of, say, 2 lb. per cwt. in the absence of fish meal or if 5 per cent. fish meal is included, as follows:—

- 4 parts finely-ground chalk or limestone.
- 1 part iodized salt.

These rations are suitable for the little pigs as well as the sows. As the young pigs advance in age after weaning, the sharps should be gradually reduced and the barley or maize proportionately increased. Fish meal should be omitted altogether in the last three weeks before slaughter, and one may remind readers that only white fish meal of first quality should be employed.

The need for green food and outdoor exercise, with facilities for rooting in fresh ground, have been stressed in previous "Notes." A correspondent writes that he has ensured a supply of iron to little pigs in the following way:—1 lb. ferrous sulphate was mixed into 2 cwt. fine silt soil, and a shovelful of this mixture was thrown into each sty where there was a litter of pigs. Previously there had been trouble with anæmia and scour. Within three days the scour had ceased, symptoms of anæmia gradually

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	5 7	0 10	4 17	72	1 4	0.71	9.6
Barley, British feeding	5 5	0 8	4 17	71	1 4	0.71	6.2
" Canadian No. 3 Western ..	5 10	0 8	5 2	71	1 5	0.76	6.2
" " " 4 " ..	5 7	0 8	4 19	71	1 5	0.76	6.2
" Argentine	5 0*	0 8	4 12	71	1 4	0.71	6.2
" Persian	4 18*	0 8	4 10	71	1 3	0.67	6.2
" Russian	5 0*	0 8	4 12	71	1 4	0.71	6.2
Oats, English white	6 0	0 8	5 12	60	1 10	0.98	7.6
" " black and grey	6 0	0 8	5 12	60	1 10	0.98	7.6
" Scotch white	6 10	0 8	6 2	60	2 0	1.07	7.6
" Canadian No. 2 Western ..	6 7	0 8	5 19	60	2 0	1.07	7.6
" " No. 3	6 0	0 8	5 12	60	1 10	0.98	7.6
" " mixed feed	5 5	0 8	4 17	60	1 7	0.85	7.6
" Argentine	5 8	0 8	5 0	60	1 8	0.89	7.6
" Chilean white	7 13†	0 8	7 5	60	2 5	1.29	7.6
" Danubian	4 17‡	0 8	4 9	60	1 6	0.80	7.6
" German	5 7‡	0 8	4 19	60	1 8	0.89	7.6
Maize, Argentine	4 15	0 8	4 7	78	1 1	0.58	7.6
" Gal. Fox.	4 7‡	0 8	3 19	78	1 0	0.54	7.6
" Russian	4 5‡	0 8	3 17	78	1 0	0.54	7.6
Beans, English winter	5 10‡	0 19	4 11	66	1 5	0.76	19.7
Peas, Japanese	28 0†	0 17	27 3	69	7 10	4.20	18.1
Dari, Egyptian	6 5†	0 9	5 16	74	1 7	0.85	7.2
Milling offals—							
Bran, British	5 0	0 19	4 1	43	1 11	1.03	9.9
" broad	6 0	0 19	5 1	43	2 4	1.25	10
Middlings, fine imported ..	5 0	0 14	4 6	69	1 3	0.67	12.1
" coarse British	5 0	0 14	4 6	56	1 6	0.80	10.7
Pollards, imported	4 15	0 18	3 17	62	1 3	0.67	11
Meal, barley	7 0	0 8	6 12	71	1 10	0.98	6.2
" " grade II	6 5	0 8	5 17	71	1 8	0.89	6.2
" maize	5 12	0 8	5 4	78	1 4	0.71	7.6
" " South African	5 5	0 8	4 17	78	1 3	0.67	7.6
" " germ	5 17	0 13	5 4	79	1 4	0.71	8.5
" locust bean	6 12	0 6	6 6	71	1 9	0.94	3.6
" bean	8 0	0 19	7 1	66	2 2	1.16	19.7
" fish	15 0	2 13	12 7	59	4 2	2.23	53
Maize, cooked flaked	6 2	0 8	5 14	84	1 4	0.71	9.2
Linseed cake, English, 12% oil ..	8 15	1 3	7 12	74	2 1	1.12	24.6
" " " 9% "	8 10	1 3	7 7	74	2 0	1.07	24.6
" " " 8% "	8 5	1 3	7 2	74	1 11	1.03	24.6
Soya-bean cake, 5½% oil	7 17†	1 12	6 5	69	1 10	0.98	36.9
Cottonseed cake—English, Egyp-							
tian seed, 4½% oil	5 17	1 3	4 14	42	2 3	1.20	17.3
" " English, Indian							
seed, 4% oil	5 15‡	1 3	4 12	42	2 2	1.16	17.3
" " Egyptian, 4½% oil ..	5 10	1 3	4 7	42	2 1	1.12	17.3
" " decorticated 7% " ..	7 10†	1 13	5 17	68	1 9	0.94	34.6
" " meal, decorticated 7% "	7 10†	1 13	5 17	68	1 9	0.94	34.6
Coconut cake, 6% oil	6 10†	1 0	5 10	77	1 5	0.76	16.4
Ground-nut cake, 6.7% oil ..	7 10†	1 1	6 9	57	2 3	1.20	27.3
" " decor. 6.7% oil ..	7 17	1 11	6 6	73	1 9	0.94	41.3
Palm-kernel cake, 4½-5½% oil ..	6 5†	0 13	5 12	73	1 6	0.80	16.9
" " meal, 4½% oil	6 5†	0 13	5 12	73	1 6	0.80	16.9
" " meal, 1-2% oil	5 15	0 14	5 1	71	1 5	0.76	16.5
Feeding treacle	5 0	0 9	4 11	51	1 9	0.94	2.7
Brewers' grains, dried ale	4 12	0 14	3 18	48	1 8	0.89	12.5
" " " porter	4 2	0 14	3 8	48	1 5	0.76	12.5
Dried sugar-beet pulp (a)	5 5	0 7	4 18	66	1 6	0.80	5.2

* At Bristol. † At Liverpool. ‡ At Hull. (a) Carriage paid in 4 ton lots.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of March, 1933, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 23s. per ton as shown above, the food value per ton is £18 17s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.29d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From

FARM VALUES OF FEEDING STUFFS

disappeared, and the pigs showed signs of general improvement.

Recently there were sold by auction from this Farm Institute recorded pigs from 16 litters with an average of 11.4 born and 9.1 reared. All the litters born since January 1, 1933, from both sows and gilts, give practically the same figure for pigs reared per litter. The sows and litters have been fed on rations on the same lines as those recommended above. It seems clear that if a herd is kept free from disease, there is no great difficulty in securing satisfactory litter averages, provided that care is taken that records are utilized in the selection of breeding stock, and that common sense is employed in management and in the feeding of balanced rations.

* * * * *

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent</i>	<i>Protein equivalent</i>	<i>Per ton</i>
	<i>Per cent.</i>	<i>Per cent.</i>	<i>£ s.</i>
Barley (imported)	71	6.2	5 3
Maize	78	7.6	4 9
Decorticated ground-nut cake ..	73	41.3	7 17
" cotton cake ..	68	34.7	7 10
(Add 10s. per ton, in each case, for carriage.)			

The cost per unit starch equivalent works out at 1.24 shillings, and per unit protein equivalent, 2.01 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the ration-

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

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ing of dairy cows, are given in the November, 1932, issue of the Ministry's JOURNAL, p. 781.)

FARM VALUES.

CROPS	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9.6	5 9
Oats	60	7.6	4 10
Barley	71	6.2	5 1
Potatoes	18	0.8	1 4
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 9
Beans	66	19.7	6 1
Good meadow hay	37	4.6	2 15
Good oat straw	20	0.9	1 7
Good clover hay	38	7.0	3 1
Vetch and oat silage	13	1.6	0 19
Barley straw	23	0.7	1 10
Wheat straw	13	0.1	0 16
Bean straw	23	1.7	1 12

MISCELLANEOUS NOTES

The Agricultural Index Number

THE general index number of agricultural produce for March at 102 was 4 points lower on the month and 11 points below the figure for March, 1932. A sharp decline in the contract price for milk was primarily responsible for the fall while the lower values ruling for grain, eggs, butter and potatoes were contributory factors. These decreases were offset to some extent by the advances recorded in fat sheep and pigs.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13=100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	—
May	154	144	134	122	115	—
June	153	140	131	123	111	—
July	145	141	134	121	106	—
August	144	152	135	121	105	—
September	144	152	142	120	104	—
October	139	142	129	113	100	—
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—Prices for wheat ruled lower during March and the average of 5s. 1d. per cwt. was 2d. below that of the

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previous month. Barley averaged 6s. 3d. per cwt. and was 6d. cheaper, while oats fell by 1d. to 5s. 11d. per cwt. The indices for wheat and oats declined by 2 points and 1 point respectively to 69 and 84, while that for barley depreciated 5 points to 79. A year ago wheat averaged 6s. per cwt., barley 8s. 3d. and oats 7s. 5d., the relative indices being 81, 104 and 105.

Live Stock.—Fat cattle again averaged 36s. 9d. per live cwt. for 2nd quality but as a seasonal rise occurred between February and March of the base period the index at 105 was 2 points lower on the month. An advance of $\frac{3}{4}$ d. per lb., however, was recorded in the price for fat sheep and the index was 6 points higher at 112, whereas a year ago fat sheep sold at precisely the pre-war level. Fat pigs also were dearer than in February, 2nd quality baconers realising 1s. 5d. and porkers 11d. per score more, and the relative indices rose by 12 and 9 points to 110 and 118. The seasonal fall in the price of dairy cows was proportionately greater than in March, 1911-13, and the index depreciated 2 points to 109. Store cattle also were lower on the month, but the reduction of 4 points in the index to only 3 per cent. above pre-war was due chiefly to the seasonal advance which occurred in the base period. Both store sheep and pigs, however, were dearer than in February, and the relative indices were higher, that for sheep appreciating 3 points to 85 and for pigs 5 points to 122.

Dairy and Poultry Produce.—The contract prices for milk sold this March were at practically summer level, whereas in the pre-war years the March price remained at the winter level. The milk index, therefore, showed a fall of 21 points to 129, as compared with a fall of 29 points to 117 a year ago. Butter and cheese were both cheaper on the month and were 7 and 3 points lower respectively at 93 and 110. As is usual at this season of the year the average for eggs fell sharply, and the decline of 4s. 10d. per 120 brought the index down to only 1 per cent. above the base period. All classes of poultry were rather dearer than in February and the combined index rose 7 points to 129.

Other Commodities.—Potatoes have continued to cheapen, the average price for March being 4s. per ton lower, and the index was only 6 per cent. above pre-war as against 13 per cent. above in February. Hay and wool

MISCELLANEOUS NOTES

showed little alteration on the month. Practically all descriptions of vegetables were cheaper and the combined index was 8 points lower at 123.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity.	1931.	1932.		1933.		
	Mar.	Mar.	Dec.	Jan.	Feb.	Mar.
Wheat	70	81	72	72	71	69
Barley	97	104	84	87	84	79
Oats	82	105	81	84	85	84
Fat cattle...	123	121	101	110	107	105
„ sheep...	130	100	91	107	106	112
Bacon pigs ...	124	97	92	99	98	110
Pork „	146	109	103	110	109	118
Dairy cows ...	130	120	114	113	111	109
Store cattle ...	125	121	103	107	107	103
„ sheep	131	91	72	83	82	85
„ pigs	175	105	108	121	117	122
Eggs	124	104	92	94	117	101
Poultry	147	123	115	121	122	129
Milk	150	117	155	155	150	129
Butter	118	107	98	97	100	93
Cheese	123	138	114	119	113	110
Potatoes	170	264	120	116	113	106
Hay	91	70	67	65	65	66
Wool	80	76	62	64	63	62

Summer Visits to Rothamsted and Woburn

FARMERS and all those who are interested in the practical, technical and educational aspects of agriculture are cordially invited to visit the Rothamsted and Woburn Plots this year, at any convenient time between the beginning of May and the end of October. Sir John Russell, the Director, will be happy to arrange for visits by organizations of farmers and farm workers; small groups of farmers are specially welcomed. Visits should, as far as possible, be notified well in advance to avoid the possibility of dates clashing, but no farmer need stay away because he has been unable to write fixing a day for his visit. It is not possible to visit both Rothamsted and Woburn in one day, but there is sufficient of interest at either farm for a full-day visit. In the event of the weather preventing an inspection of the fields at Rothamsted, the results of the work are available for examination in the new Demonstration Room. Mr. H. V. Garner and Captain E. H. Gregory will be in charge of the demonstrations.

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At Rothamsted, where the soil is heavy loam, may be seen the " Classical " fields, laid down from 1843 onwards, affording an unequalled demonstration of the effects of fertilizers on wheat, barley, mangolds and meadow hay. The continuous growing of wheat on Broadbalk field will be of special interest to farmers who are faced with manurial and cultivation problems arising out of mechanized cereal farming. Modern fertilizer and cultivation problems, under investigation by the new field technique developed at the Station, are concerned with the growing of potatoes, sugar-beet, barley, kale, fodder crops, and permanent grass. There are special rotation experiments to test various alternative methods of returning cereal straw to the soil. Other experiments in progress deal with poultry manure, the effect of bare fallowing, and rotary cultivation; and among husbandry problems being studied are those of silage making and of the various crosses of the half-bred sheep. Good types of implements are on view at the Station, to which, also, a complete electrical installation has just been added.

At the Woburn Farm, on light soil, " Classical " fields, now in their 55th season, are to be seen, and in addition, there are modern experiments in progress on potatoes, barley, sugar-beet, kale and permanent grass.

All communications and requests, in connexion with these visits, should be addressed to The Secretary, Rothamsted Experimental Station, Harpenden, Herts.

Course of Instruction in Pig Management

A FOUR-DAY course of instruction in pig management, held at the Staffordshire Farm Institute, Penkridge, March 27-31, this year, was attended by 27 young men, chiefly sons of farmers in the county area, although others came from as far away as Yorkshire, Lancashire and Sussex. The syllabus included instruction on breeds and breeding; and feeding and general management with special attention to disease. The judging of pigs was illustrated in a practical manner, and the importance of the commercial type emphasized. Demonstrations were also given in castrating, worming, etc. During the course, a visit was paid to the factory of Messrs. Marsh & Baxter, Brierley Hill, where the various processes of bacon-curing were shown. One afternoon was spent at Harper Adams

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Agricultural College, where the Principal, Dr. C. Crowther, addressed the class on the results of pig-feeding experiments conducted at the College.

The final meeting of the class was an open one, presided over by Sir J. Q. Lamb, M.P. (Chairman of the County Committee for Agricultural Education), at which about 80 local farmers were present. Addresses by Mr. J. Jackson (in the absence of Mr. A. E. Marsh) and Dr. C. Crowther were followed by an interesting discussion, during which various questions were asked and answered.

* * * * *

Foot-and-Mouth Disease.—Since the previous (April) issue of this JOURNAL went to press, the Ministry has confirmed the existence of four further cases of Foot-and-Mouth Disease in the immediate vicinity of the City of Leicester. These have necessitated the maintenance of the usual restrictions, already in force, on the movement of cattle, sheep, goats, pigs and deer within an area surrounding that city.

* * * * *

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on Tuesday, April 11, 1933, the Rt. Hon. the Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Cheshire.—An Order continuing the existing minimum and overtime rates of wages from May 1, 1933 (i.e., the day following that on which the existing rates are due to expire) until October 31, 1933. The minimum rates in the case of male workers of 21 years of age and over are 31s. per week of 54 hours, with overtime at 8d. per hour. For female workers of 18 years of age and over the minimum rate is 6d. per hour for all time worked.

Essex.—An Order fixing minimum and overtime rates of wages to come into operation on April 16, 1933, and to continue in force until March 24, 1934. The minimum rates for male workers of 21 years of age and over are 30s. per week of 43 hours in the weeks in which Easter Monday and Whit Monday fall, 52 hours in any other week in summer, 39½ hours in the week in which Christmas Day falls instead of 41½ hours as formerly, and 48 hours in any other week in winter instead of 50 hours as formerly, with overtime throughout the year unchanged at 9d. per hour on week-days (including Easter Monday and Whit Monday) and 10d. per hour on Sundays and on Christmas Day. The minimum rate for female workers of 21 years of age and over is unchanged at 5½d. per hour for all time worked.

Northumberland.—An Order fixing minimum and overtime rates of wages to come into force at noon on May 13, 1933 (i.e., when the existing rates are due to expire) and to continue in force until noon on May 13, 1934. The minimum rates for male workers of 21 years of age and over employed as stewards, horsemen, cattle-men, stockmen or shepherds and hired by the week or longer period are unchanged at 37s. 6d. in the case of workers who are householders, and 34s. 6d. in the case of workers who are not householders, per week of customary hours (not exceeding 62). For male workers of 21 years of age and over (except workers in casual employment) the minimum rate remains unchanged at 30s. 6d. per week of 48 hours in winter and 52½ hours in summer,

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overtime being payable in the case of all regular male workers at the rate of 9*d.* per hour on weekdays and 11*d.* per hour on Sundays. The minimum rate for casual male workers of 18 years of age and over remains unchanged at 7*d.* per hour for all time worked. For female workers of 18 years of age and over the minimum rates remain unchanged at 5*d.* per hour in the case of regular workers and 3*d.* per hour in the case of casual workers, with overtime at 6*d.* per hour and 4*d.* per hour respectively.

Merioneth and Montgomery.—An Order continuing the existing minimum and overtime rates of wages from May 1, 1933 (i.e., the day following that on which the existing rates are due to expire) until April 30, 1934. The minimum rates are, for male workers of 21 years of age and over employed wholly or mainly as stockmen, teamsters, carters or shepherds 31*s.* per week of 60 hours, and for other male workers of 21 years of age and over 27*s.* per week of 54 hours, with overtime in each case at 9*d.* per hour. The minimum rate for female workers of 18 years of age and over is 5*d.* per hour for all time worked.

* * * * *

Enforcement of Minimum Rates of Wages.—During the month ending April 14, legal proceedings were taken against six employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
		£ s. d.	£ s. d.	£ s. d.	
Derby ..	Bakewell ..	1 0 0	10 0	22 13 4	2
Lincoln : Kesteven and Lindsey	Horncastle ..	18 0	2 19 6	8 8 0	2
Nottingham	Newark ..	1 0 0	1 0	3 12 0	1
Suffolk ..	Halesworth	6 10 0	3 5	3 5 5	1
Sussex ..	Haywards Heath ..	32 0 0	—	47 14 10	4
Pembroke : Cardigan ..	Pembroke ..	—	16 6	8 7 0	1
		41 8 0	4 10 5	94 0 7	11

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Devon.—Miss I. M. Unkles, N.D.D., C.D.P., who formerly held the post of Instructor in the Travelling Poultry School, has been appointed Instructor in Dairying and Poultry-keeping.

WALES

Brecon and Radnor.—The death of Mr. David Thomas, the Agricultural Organizer, is announced. Mr. William Evans, B.Sc., N.D.A., N.D.D., Assistant Organizer, is, for the present, Acting Agricultural Organizer.

Merioneth.—Mr. Edwin Jones, B.Sc., Assistant Organizer and Lecturer in Agriculture, Madryn Castle Farm School, Caernarvonshire, has been appointed Agricultural Organizer, *vice* Mr. Moses Griffith, resigned.

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Teaching Staffs at University Departments of Agriculture, Agricultural Colleges, etc., in England and Wales.

The Midland Agricultural College, Sutton Bonington

Mr. J. N. Dominy, P.A.S.I., has been appointed Lecturer in Building Construction and Assistant Lecturer in Surveying, *vice* Mr. G. Tolley.

Miss G. M. J. Henderson, N.D.D., C.D.P., has been appointed Assistant Instructress in Poultry-keeping, *vice* Miss V. C. Milner, N.D.P.

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Mole Draining With and Without Pipes, with special reference to the Poppelsdorfer drainage appliance. (Die Maulwurfadränung ohne und mit Tonröhren unter besonderer Berücksichtigung des Poppelsdorfer Dränbaus.) By Dr. C. Kuhlewind. Pp. 77. (Berlin: Paul Parey, Hedesmannstrasse, 28 and 29, S.W.II. 1932. Price RM.7.80.)

A great many pamphlets and articles have been written on the subject of mole draining, not the least important of which is perhaps the Bulletin issued by the Oxford Institute of Agricultural Engineering, but the time has become ripe for the publication of a comprehensive treatise such as that now placed before us by Dr. Kuhlewind. It is true that this treatise has particular reference to a German apparatus which is specially designed for the purpose of putting in pipe drains following the line of a mole which is drawn by the apparatus. Nevertheless one-half of the book deals with the problems involved in mole draining without pipes, and surveys present knowledge on the subject. It describes the types of plough and the methods of hauling used in such diverse countries as England, France, Germany, Sweden, Denmark and Holland. After discussing the physical problems and effects of mole draining, the author enters into the question of costs, and rightly says in his summary that the technical questions involved in mole draining without pipes are completely solved, speedy and effective apparatus being available in most of the countries where the work can be done with advantage: at the same time he admits that the length of life of the drains in different types of soil, and how far it is affected by damage caused by burrowing animals or the roots of plants, has not yet been conclusively determined. In spite of this disadvantage, however, he very reasonably considers that on large-scale farms where track-laying tractors or a tractor with a winding drum may be owned, the work of mole draining should be regarded as of a recurrent character and a part of the ordinary practice of the farm. He states his considered opinion that mole draining unsupported by pipes is the cheapest method of reducing the water-content of the soil.

With regard to the Poppelsdorfer apparatus, the author is explicit in his description of its construction, and he points out that experiments in this direction were made in the middle of last century when Fowlers exhibited a somewhat similar type of apparatus at one of the Royal Shows. Apparently the German apparatus owes some of its ideas to this example; similarly the Dutch machine, known as the "Visser'sche" which has been used in connexion with the drainage of the Zuyder Zee, is built along the same lines, although that implement can be adapted for using wooden pipes. Other types of pipe such as iron and cement can also be used with the Poppelsdorfer plant. Most of the land in which mole draining is undertaken in this country, however, is of the heavy clay type, in which the ordinary method of mole draining proves entirely satisfactory.

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In lighter land where it is necessary to line the mole with pipes in order to prevent blocking by collapse, the Poppelsdorfer apparatus will prove useful. In this country there is now at least one firm which makes a plant to undertake the same operations, and, although further experience is necessary before its work can be definitely pronounced upon, it is interesting to have the benefit of such a careful discussion of the possibilities provided by the new apparatus as that supplied by Dr. Kuhlewind, more especially when two or three countries are experimenting in the use of similar plant.

Flowerless Plants. Part II of an Introduction to Structural Botany. By D. H. Scott, M.A., Ph.D., LL.D., D.Sc., F.R.S. 10th edition, re-edited by F. T. Brooks, M.A., F.R.S. Pp. xvi + 332. 127 illust., and glossary. (London: A. & C. Black, Ltd. 1932. Price 7s. 6d.)

All those engaged in the teaching and learning of Botany will welcome the appearance of a new and revised edition of Dr. Scott's well-known introduction to the study of Cryptogamic plants. Mr. Brooks, who has re-edited the present edition, was also partly responsible for the last edition of the companion volume on flowering plants. The most important changes in this edition are the inclusion of three more types, viz., *Peronospora parasitica*, *Saccharomyces*, and *Euglena viridis*; the omission of *Cladothrix*; and the revision of several of the chapters, notably those on *Ulothrix*, *Ectocarpus* and *Puccinia*, to bring them into line with the results of modern research. The format of the book has been improved by the use of clearer type and a rather larger page.

Twenty-five types in all are described, including members of the *Pteridophyta*, *Bryophyta*, the green, brown, red and blue-green Algae, *Fungi*, *Bacteria*, *Myxomycetes* and *Flagellata*. The concluding chapter is devoted to a commendably cautious summary of the probable relationships of the plants described. The two volumes together still form one of the clearest and most useful introductions to the study of the structure of plants.

Producing Farm Livestock. By J. L. Edmonds, W. E. Carroll, W. G. Kammlade, W. B. Nevens and R. R. Snapp. Pp. xiii+439. 111 Figs. (London: Chapman & Hall, Ltd. New York: John Wiley & Sons. 1932. Price 15s. 6d.)

This text-book maintains the high standard now expected of the Wiley series of farming manuals. It provides a systematic and well-arranged treatment of a wide range of topics, embracing beef and dairy cattle, horses, sheep and pigs, but excluding poultry and small live stock. The main emphasis is placed upon the larger problems confronting live stock producers, and some sound advice is given upon the policy and strategy of the business without overloading the text with too much detail. Useful suggestions for adjusting live stock and crops to the amount of labour available are given in the section devoted to the preparation of a plan of management and sound rules are laid down for the feeding of dairy cows and preparations for calving.

In the beef cattle section, the advantages of de-horning are pointed out, and the need of these cattle for salt is stressed. Mnemonic rhymes for feeding are given, and baby beef production receives its share of attention. In praise of horses, it is mentioned that "horse costs may be largely non-cash costs," but it is curious to note that horses are to be watered after, as well as before, feeding. As regards sheep, the importance of good breeding, as well as of good feeding, is indicated, and the essential need of sheep for water is not overlooked.

Sanitation is emphasized as being of major importance in pig husbandry, and, for pig feeding it is claimed that two parts of whey are equal to one part of skim milk.

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There are some weak points, such as the statement that 12 gallons of water make an adequate daily allowance for a cow; or that bacteria produce vitamins by their growth during digestion. The advice given on clean milk production, too, is not free from objection, since no mention is made of the steam sterilization of dairy utensils, the advice given being to use chemical disinfectants. That "a good plan of cooling milk is to keep the milk cans in a tank filled with running water, and stir the contents every few minutes" is another statement that can hardly pass unchallenged.

With a few exceptions, such as those mentioned, the text is of considerable value. The volume includes useful hints on preparing live stock for exhibition, and the chapters on marketing and on live stock improvement deserve close study.

Model Farm Lease. (*Modèle de Bail à Ferme.*) By A. Sibille.

Pp. 64. (Paris: Librairie Agricole de la Maison Rustique. 1932. Price 12 francs.)

This brochure has been prepared for the guidance of French agricultural landowners and their prospective tenants, as well as country lawyers, but will be of interest to British readers who have the inclination to study the points of similarity or difference—especially the latter—between the law and the customs prevailing in regard to land tenure in this country and across the Channel. The first part consists of model clauses for a farm lease, with comments and explanations by the author. This is followed by useful suggestions of a practical kind for a record of the state of the house, buildings and land with the view of avoiding disputes on changes of tenancy. Rules are suggested for the calculation of the residual value of improvements for which an outgoing tenant should be compensated, and a chapter is devoted to damage by game. One fact that emerges from a study of this little book is that the rights of agricultural tenants in France are by no means as clearly established as they are in this country, where the relations of landlord and tenant have long ceased to be ruled by custom and contract alone, and where a succession of statutes extending over forty years have conferred valuable rights and privileges on the tenant farmer.

The Book of the Rat. (*Das Rattenbuch.*) By Dr. R. Koller.

Pp. xi + 160. 10 figs. (Hanover: M. & H. Schaper, Marienstrasse 8, 1 M. 1932. Price RM.9.)

The writer of this work deals with his subject very thoroughly, and has collected the experiences and opinions of many of the scientific and practical authorities of the world upon the rat problem. As a veterinarian, he also deals exhaustively with the role of the rat in relation to animal diseases.

Mussolini's Wheat Campaign: Italian Agriculture under the Dictator. (*Mussolini's Getreide-Schlacht: Italienische Landwirtschaft im Zeichen der Diktatur.*) By Dr. Emil Müller-Einhart.

Pp. xv + 188. (Regensburg: G. J. Manz. 1933. Price RM.2.85.)

The official statement in English issued by the Italian authorities regarding the wheat campaign carried out in that country contains a description of the methods adopted and an indication of the measure of success obtained. Dr. Müller-Einhart's book now gives us a descriptive and critical account of the attempts that have been made in Italy under the Fascist regime to render that country self-supporting in cereal products. The Italians use a much larger proportion of wheat in their dietary than the inhabitants of almost any other country, and hence the national wheat crop is a matter of supreme importance to them. Before and during the war it was found that here, as in most other countries of Western Europe, internal production was diminishing while the quantity annually imported was increasing. Since the war national policy in practically all countries of Western Europe has taken the direction of attempting to make

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each country individually self-supporting in the matter of cereal supplies. Before the war, over a very large area of Italy, agriculture was backward compared with that of some other occidental countries. Steps were therefore taken to stimulate an improvement in farming technique, and when the Wheat Campaign was opened educational work was undertaken by means of Travelling Chairs in Agriculture, experimental work conducted by the Agricultural Colleges and Stations, and with the co-operation of the national agricultural organizations of landowners, tenant farmers and workmen. Prizes were offered for extending the wheat area and for producing high yields of good wheat of milling quality. Arrangements were also made for providing farmers with improved machinery and seeds.

As a result of the campaign, it seems that with an increase in the use of chemical fertilizers and of selected varieties of seed, as well as an increase in the number of farm machines, there has been an increase in the area under wheat and in the yield obtained. Collaterally with this development there has been an improvement in other branches of agriculture, due partly to the educational and financial facilities that have been made available to Italian agriculturists.

Animal Industry in the British Empire. By A. N. Duckham. Pp. xiv + 235. 18 illust. (London: Humphrey Milford, Oxford University Press. 1932. Price 15s.)

Mr. Duckham was appointed by the Imperial Bureau of Animal Nutrition, Aberdeen, to carry out a survey of animal husbandry within the British Empire, and this book, which has a foreword by Dr. J. B. Orr, Director of the Bureau, is based on the data collected by the author in the course of his study.

After a preliminary survey indicating the importance of animal husbandry to the Dominions, and the extent and organization of production, the author deals separately with the British Isles, Canada and Newfoundland, Australia and New Zealand, and the Union of South Africa, describing the geographical and economic conditions pertaining to each country and showing how these factors influence the methods and problems of production and marketing of the several animal products.

There is a chapter on "Mechanical" Efficiency of Production, in which Mr. Duckham assesses the quantitative output for the different countries. Problems arising from nutrition, disease, breeding and climate are discussed generally, but, in a work covering so vast a subject, anything more than a broad outline would be impossible. In the concluding observations, the author summarizes the relative potentialities of the various Dominions with reference to the expansion of inter-Imperial trade in animal products. The Appendixes include a survey of Animal Husbandry in India and the Colonial Empire, statistical tables and a selected bibliography.

In the foreword, Dr. Orr explains that the primary object of the survey was to enable those responsible for the administration of research to consider—in the light of their economical importance—the many biological problems presented to them, and suggests that the book should interest all engaged in considering schemes for the development of inter-Imperial trade. It can also be recommended to all students of farming.

The English Flower Garden. By William Robinson. Fifteenth Edition. Pp. xviii + 720. Numerous illustrations. (London: John Murray. Price 18s.)

The fifteenth edition of this well-known and much-read book was recently published. It differs from the first edition, which was burdened with much about tender plants, in dealing only with plants hardy in our climate: and of these plants the list is a full one and the information given about each is extensive. The plants are arranged in alphabetical order, commencing with *Abelia* and ending

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with *Zizania* (wild rice), and the information given covers geographical distribution, number of species, the best garden varieties, and the methods of propagation for each. This is just the information a gardener needs, and hence the book has been greatly favoured.

Other chapters on art in relation to garden designs, on borders, paths, spring gardens, etc., are very interesting reading and of absorbing interest, especially to those about to construct a garden.

The author strikes a new note in his foreword in advocating the propagation of roses, apples and pears on their own roots. His advice may be sound, but before it can be widely followed there are many practical difficulties (in propagation) to be overcome. Man has chosen the easier method of propagating these plants by grafting and budding, and has achieved rather better results than this book indicates; moreover, gardeners prefer to grow trees in the form of cordons, espaliers or pyramids, and not of the "forest tree shape" pictured by the author.

Silage Preparation. (*Silofuttermbereitung.*) By Dr. Hellmuth Munsberg. Pp. 46. Illust. (Berlin: Paul Parey, Hedemannstrasse 28 and 29, S.W.11. Price RM. 2.20.)

Although the harvesting of grass as hay is a well-established practice and not at present likely to be entirely superseded, there has been a good deal of discussion of late on methods that may enable advantage to be taken of recent extensions of our knowledge of the nutritive value of young grass. In this direction suggestions have been made for the harvesting of the grass at an early stage of growth and conserving by various methods; amongst these figure methods of making silage and of treating it so as to preserve the material in the same nutritive condition as it would be if it were grazed by the animal on the ground. Many of these systems rely upon the admixture of chemicals with the ensiled grass or other forage crop. The chemicals may be in an ordinary commercial form, or in the form of patented secret preparations. This small brochure aims at presenting a survey of existing knowledge on the subject. It contains a description of the different "pickling" methods, their advantages and disadvantages, methods of building the various containers, the feeding value of the different forage crops, and the influence on the quality of the milk and volume of milk production.

The Journal of the Orkney Agricultural Discussion Society. Vol. VII (1932). Pp. 75. (Obtainable from the Secretary, Agricultural College, Kirkwall, Orkney. Price 1s. 6d., post free.)

Farmers further south will find much to interest and instruct them in this Journal, which contains articles on such varied subjects as horse diseases, poultry management, reclamation of hill land, road-making, rural housing, shell sand deposits, singling of turnips, stack-building, weeds, and weights and measures. An interesting feature is provided by reports of inter-college debates on such topics as land nationalization, old versus new varieties of oats, and "Have Women Contributed more to Success in Orkney Farming than Men?" There is also a review of the Agricultural Marketing Act.

The Marketing of Rabbit Flesh. By W. King Wilson. Pp. 72. Illust. (Idle: Watmoughs, Ltd. 1932. Price 1s. 6d.)

Although rabbit breeding for fur and wool continues to make progress, the production of rabbits solely for table purposes has not assumed such proportions in Britain as in certain other countries. The number of rabbits produced cannot be accurately ascertained, but the importance of the industry may be estimated by studying the tables in this brochure showing the imports of rabbit flesh. A chapter on the production of table rabbits in other countries refers to the experimental stations that have been established to assist the industry. A striking example of the nutritive value of rabbit flesh as compared with other meat is shown in tabular form and should encourage

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increased consumption of this food by the public. Methods of killing, skinning, dressing and marketing are fully described, and the concluding chapter deals with market requirements, particularly in the metropolitan area. It would appear that, if a good quality product is supplied, packed and graded according to market requirements, and continuity of supplies can be maintained, a ready market exists for home-produced rabbit flesh. This brochure by the rabbit specialist at Harper Adams Agricultural College should help to arouse interest in the subject.

German Agricultural Policy in Relation to Native and Foreign Economic Policy. (*Deutsche Agrarpolitik im Rahmen der inneren und äusseren Wirtschaftspolitik.*) Part I. The Position of German Agriculture and the Development of Agricultural Legislation. Part II. German Agricultural Policy as an Organic Stimulus to General Economics in Germany. Part III. Agriculture and Agricultural Policy in Countries other than Germany. Prepared for the Friedrich List-Gesellschaft by Fritz Beckmann, Hermann Bente, Bernhard Harms, Edgar Salin, Theodor Brinkmann and Werner Henkelmann. 3 Vols. Pp. xviii + 785; ix + 733; viii + 384. (Berlin: Reimar Hobbing. Price RM. 60.)

If a comprehensive and considered review of this work were to be prepared it would almost inevitably need to be a co-operative labour of specialists and would occupy many pages of this JOURNAL. It is therefore necessary to confine this notice to a rough indication of the contents of the three volumes in the hope that the work will receive the attention it deserves.

The first volume opens with a short essay on "The problems of the future of German agriculture," and proceeds to a general discussion of "Production and Consumption" under the headings of "Population trends, economic structure and agricultural markets" and "The consumption of foodstuffs in Germany before and since the war." Thence under the general head of "Production and sale of individual products" it covers in separate chapters the whole range of crops, animal products and secondary products that are put out by the German farmer. The economic returns of German agriculture are next considered in some detail, and a special section is devoted to the purchase price and rent of land.

The problem of reducing costs of production while increasing the net output confronts farmers in all parts of the world, and this problem in its various aspects is discussed in fourteen essays, two under the general title of "Increased production and farm organization," four under that of "Labour market and capital market," four under that of "Mechanical aids to cost reduction," and three under that of "Price lag and market reform."

Volume 2 is divided into three sections having the general titles of "Social economy and world economy," "The general system of German agricultural policy," and "Agricultural policy and general economic policy." These subjects are discussed in three, thirteen and eight essays respectively, the whole being completed by an essay entitled "A new era in German economic policy."

Volume 3 contains an introductory essay entitled "International problems of trade policy in agricultural produce," and the balance of the volume deals in fourteen essays with agriculture and agricultural policy in many different countries, while in thirteen shorter essays a survey is given of conditions in as many additional countries.

Such a work is obviously too comprehensive to be considered in detail here, but from what has been said it will be clear that it provides a mine of material that will be of no mean service to those engaged upon the solutions of the problems that confront farming in its international aspects as well as in the more restricted phase of national problems.

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Gardens and Gardening: Books in the Bristol Public Libraries.

Prepared by J. Ross, F.L.A. Pp. 38.

This attractive catalogue has been prepared with the object of drawing attention to the horticultural department of the Bristol Public Libraries. The books are grouped in sections representing various aspects of the subject, brief indications of the scope of a particular work being added in certain instances.

Geese Breeding, Rearing and General Management. By R. Appleyard. Pp. 90. Illus. (London: "Poultry World" Ltd. 1933. Price 2s. 6d.)

Geese have been domesticated from early times, as we learn from Homer and from the story of Juno's geese in the Capitol at Rome. When common land was available in practically every village, large numbers of geese were bred by cottagers and others. The enclosure of so many commons, combined with injudicious breeding and the advent of the turkey, must be held responsible for the decline of goose-keeping in this country. The present brochure should help to encourage this industry, which requires only a moderate capital expenditure, and which, if properly managed, will provide a paying hobby or a profitable living. The author writes primarily for the novice, whether general farmer or smallholder, giving details concerning the varieties, and the purposes which they serve, together with useful information regarding mating, breeding, incubation, rearing and management of young and adult stock.

Classified List of Daffodil Names. Pp. 210. (London: The Royal Horticultural Society. 1933. Price 1s.)

The last edition of this list was published in 1931, since when over three hundred new names have been registered with the Society. These are included in the present edition, which contains some 6,000 names and may be regarded as a complete and comprehensive guide to the nomenclature of daffodils. The name of the raiser and approximate age of each variety are recorded, and in respect of all varieties registered since 1927 the names of the persons or firms registering are also given. In the interests of horticulture, it is desirable that this useful list should have a wide circulation.

Sprouting Tests for the Descriptions of Potato Varieties. (*Die Lichtkeimprüfung zur Bestimmung der Sortenechtheit von Kartoffeln.*) By Dr. K. Snell. Pp. 40. Illus. (Berlin: Paul Parey, 28 and 29, Hedemannstrasse, S.W.11. 1932. RM.2.80.)

The identification of potato varieties by the colour, shape and form of the sprout has been developed in Germany and in this book. Guidance is given for the methods of sprouting and for the recognition of varieties by means of a key and brief descriptions. The identification depends largely on subtle colour distinctions which are not easy for the ordinary grower to grasp and carry into practice.

A Frenchman in England, 1784. By François de la Rochefoucauld. Trans. S. C. Roberts. Pp. xxx + 256. (Cambridge: The University Press. 1933. Price 8s. 6d.)

Travellers' diaries, especially if the traveller is a foreigner to the country he is describing, necessarily contain information that it would not occur to a native to provide. In the eyes of such a traveller, many things are strange and worthy of record which to the native are familiar and escape his attention simply because they seem to be so usual as to be known to everyone. This is not, of course, the invariable truth, because some native travellers have for the object of their journey the recording of the local practices and conditions in different areas of their country.

So far as farming is concerned, the travels of Arthur Young, both those reported in separate works and the records of "Tours" which occur in the "Annals of Agriculture," have provided an almost com-

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plete picture of the condition of English farming in his day. Since de la Rochefoucauld, when he visited England, lived near Young, and was accompanied by him on his tours in Suffolk* and Norfolk, it would be a little surprising if his diary contained information additional to that supplied by his English companion. The present diary, however, does serve to corroborate the information drawn from the other source, and for those who are not so particularly interested in the condition of farming, the pleasant style of the translation and the descriptive and amusing comments upon the customs of the English in their social life make it entertaining reading.

It was, for instance, a curious habit of our forefathers to wash their houses both inside and out every Saturday night; but in spite of this admirable cleanliness in the parts of the houses open to observation, the conditions of the kitchens, in which the enormous meals of the day were cooked, were, not to put too fine a word upon it, filthy. De la Rochefoucauld, therefore, decided that he would enjoy his meals better if he kept himself to the clean parts of the houses. It is also amusing to learn that there was a freedom of verbal expression and a want of privacy in living that appeared to this young Frenchman a little crude, when we recall the disapprobation with which our more recent ancestors have regarded Continental manners.

Compared with many of the journals of tours written by English travellers of the day, for the publication of which only the contemporary enthusiasm for this form of literature can have been sufficient excuse, this young Frenchman has produced an eminently readable book. For this reason perhaps we may hope for the translation and publication of a manuscript describing a more extensive tour carried out by the same young man, mentioned by Mr. Roberts in his introduction. Students of farming history will however look forward even more keenly to the time when Mr. Roberts deals with a manuscript primarily concerned with contemporary agriculture, from the hand of de la Rochefoucauld's companion, M. de Lazowski, which is also referred to by him.

Britons in Partnership. By L. St. Clare Grondona. Pp. 188. (London: Lovat Dickson, Ltd. 1932. Price 3s. 6d.)

In his "Prelude" to this study, the author quotes a couplet from the Australian poet, Harry Lawson:—

"Am I sane in a world that is mad,
Or mad in a world that is sane?"

It is a refrain that recurs to the mind with some frequency during the reading of the scheme for inter-Imperial development which Mr. Grondona has put together with so much industry and enthusiasm.

If his Imperial Utopia lacks something of the literary elegance of predecessors who have elaborated similar themes, it more than makes up for any shortcomings by the care that has been expended upon the practical business of developing our "peerless heritage." Nothing, from the financing of an £85,000,000 Chartered Company by Government guarantee, for the purpose of acquiring land for rural development in the Dominions and in the United Kingdom, to the trapping of hens, is too big or too little to escape Mr. Grondona's attention. Indeed, unless it is held that exclusive concentration upon the temperate areas of the British Empire betrays a somewhat myopic outlook upon the rest of the world, with a consequent risk of a certain lack of balance in the work as a whole, he can claim with justice to have covered his enormous field with a complete disregard of difficulties which would have discouraged a less enthusiastic writer.

Unfortunately it is impossible to follow Mr. Grondona into details of a plan which he rightly claims would "revolutionize the economic disorder which has wrought such havoc in the British Empire of recent

* Cf. *Annals of Agric.* II (1784), p. 105 ff., and a modern reprint of the "Tour" in the London School of Econ. Reprints of Scarce Tracts, No. 14.

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years." But to those who are interested to learn of the lengths to which the possibilities—if not the probabilities—of inter-Imperial development can be taken, this book may be commended.

Delphiniums: Their History and Cultivation. By G. A. Phillips. Pp. 256 and 41 figs. (London: Thornton Butterworth, Ltd. 1933. Price 10s. 6d.)

The appearance of yet another book devoted entirely to delphiniums serves to emphasize the important position that these plants occupy in the floral world. The publishers describe it as "the standard work" on the subject, and the fact that the author has not only been assisted by all the leading British raisers, but has dealt carefully with the work accomplished both on the Continent and in America, serves to uphold the claim. Modern varieties are dealt with informatively, and a chapter on species forms a valuable contribution to our knowledge of the botany of the genus. The instructions concerning propagation, planting and cultivation are also concise and practical, but the chapter on cross breeding and hybridization is disappointing. As the author states: "There is a practically unexploited field for genuine hybridization to-day . . ."; in other words, he admits that the subject of breeding is one which calls for the employment of more scientific principles such as trained geneticists have at their disposal. The volume is well printed and illustrated, and sets forth in an attractive and comprehensive manner the present state of our knowledge of this delightful race of plants.

Shrubs and Trees for the Garden. By A. Osborn. Pp. 576, 8 colour plates and over 300 photographs and diagrams. (London: Ward, Lock & Co., Ltd. 1933. Price £1 1s.)

Since the publication of W. J. Bean's monumental work on trees and shrubs hardy in Great Britain, the ornamental shrubs have become increasingly popular, and this new book by the Curator of the Arboretum at the Royal Botanic Gardens, Kew, deals specially with ornamental trees and shrubs suitable for cultivation in gardens. Particularly valuable are the chapters designed to guide the planter in his choice of subjects; lists are given of various types of trees and shrubs suitable for cultivation in different situations and soils. Cultural methods, including propagation and pruning are clearly explained and these chapters are followed by detailed notes on a very large number of trees and shrubs alphabetically arranged and liberally illustrated by photographs. The coloured plates do not seem worthy of the high standard of the rest of the book, which will undoubtedly fulfil its objective of being a practical guide for the beginner and a standard work of reference for the expert.

Barley Survey. (E.M.B.62.) By H. C. Grant. Pp. 192. (London: H.M. Stationery Office. 1933. Price 2s.)

This handbook, issued under the auspices of the Empire Marketing Board, contains a study of barley production, exports, imports, marketing, markets, and prices in the principal exporting and importing countries in the world. The text is amply provided throughout with suitable charts and tables, and there is a further collection of 36 useful statistical tables in the appendix.

Although world production has somewhat increased in recent years, there has been a big shrinkage in the international trade in barley owing to a general decline in the utilization of barley for human consumption, mainly in the form of beer and spirits. The pressure of supplies on the market makes it more necessary than ever for producers and other sellers to give closer study and more attention to the requirements and possibilities of the market. This barley survey will be found of useful service in that connexion.

ADDITIONS TO THE LIBRARY

As compared with pre-war years, the acreage of barley in Canada has trebled, and barley is now regarded there as a major cash crop. Producers in Canada, therefore, are vitally concerned in finding an outlet for their surplus, and should find this survey of particular interest. The study is not, however, confined entirely to Canadian conditions, and it is hoped that its examination of various European and other consuming markets will prove of value to growers and traders elsewhere throughout the Empire.

Artificial Farmyard Manures. (*Le Fumier Artificiel.*) By C. Lafite et J. Caudron. Pp. 56. Illus. (Paris: Librairie Agricole de la Maison Rustique. 1933. Price 4 frs.)

The making of artificial farmyard manure has occupied the attention of a great many agriculturists over a long period, and the honour of having discovered a satisfactory process whereby vegetable wastes can be made into serviceable manure falls to the Rothamsted Experimental Station. The experiments which are described in this pamphlet are based to some extent upon the work done at Rothamsted, although an earlier experiment was carried out in 1892 in France.

With the disposal of the milk herd of the Ferme des Anglais in 1928, it was found that the supplies of manure obtained from feeding beasts and horses on the farm were insufficient to furnish the usual and necessary dressings for the semi-arid conditions of Champagne. As a result of experiments which were then commenced, a satisfactory process for the manufacture of artificial farmyard manure was evolved, and instructions for carrying out the process are given in the pamphlet. Straw is treated with applications of liquid manure or the mud of pond beds or ditches and watered frequently, and nitrogen in the form of cyanamide or sulphate of ammonia or urea is added. The brochure also describes the experience that has been gained in the use of artificial farmyard manure in market gardens, and discusses the cost of production and the returns that may be expected as well as devoting a few pages to the use of artificial manure combined with the natural product.

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- Lloyd, F. C.*—The Rex Rabbit. (53 pp.) Vancouver: Mitchell Printing and Publishing Co., 1931. [63.69.]

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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The Cahn Hill-Improvement Scheme

INVESTIGATIONS on the improvement of hill land are of considerable importance, for there are large areas of poor land in the hill districts that may be enabled to carry a much larger head of stock than they do at present. Professor R. G. Stapledon and his staff at the Welsh Plant Breeding Station, Aberystwyth, are making an effort to determine the best means by which improvement may be effected. In July, 1932, Sir Julien Cahn responded generously to the appeal made by the Station for assistance towards this important work, already begun, on the improvement of hill land.

The work had reached a stage when it was essential to conduct large-scale experiments involving not only the improvement of the grazing but also the control and management of the animals on somewhat novel lines. It was therefore necessary that the Station should obtain possession of suitable lands for the purpose, and that Professor Stapledon should have associated with him a man fully competent in the management and breeding of stock. As a result of Sir Julien Cahn's benefaction, these requirements have been met, and all arrangements have been made for the inauguration of a comprehensive and far-reaching scheme of hill improvement. Mr. Moses Griffith, recently the Agricultural Organizer for Merionethshire, and a well-known breeder of Welsh black cattle, has been appointed to assist Professor Stapledon as Lands Director to the scheme.

A lease has been entered into with the Hafod Estate, for an area of approximately 2,700 acres of hill land, comprising a mountain sheep walk of over 2,000 acres, and a hill farm consisting of hill and cultivated land. It is fitting that the area chosen is on an estate with a long pioneering history behind it. Already at the end of the 18th century Johnes of Hafod was planting trees amongst

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these inhospitable hills and devoting himself with enthusiasm to improving the agricultural conditions of the district. The locality has another and no less interesting association, for it lies behind Devil's Bridge amidst the romantic and rugged scenery immortalized by George Borrow in "Wild Wales."

Times have changed, however, and the tractor has already made its mark on land never before ploughed, manured or sown to crops. Possession was taken of the hill farm at Lady Day, and operations were immediately started. It is hoped that at least 50 acres of hill will be grassed out by the end of June, and each succeeding year large areas will be taken in hand by the methods that have been developed as the result of experiments conducted by Professor Stapledon in various parts of Wales in recent years. In addition to the land at Hafod, about 70 acres of hill land have also been taken near Knighton in Radnorshire, and operations will be started there in the autumn.

The authorities of the University College of Wales, realizing the national and imperial importance and implication of the work with which they have been entrusted, and also that the enterprise was entirely distinct from the main researches of the Plant Breeding Station, decided to set up a special Committee to administer the scheme. The scheme, which will be officially known as "The Cahn Hill-Improvement Scheme," will consequently be under the direction of a particularly strong and representative Committee that will ensure the confidence of the agricultural community in the conduct of this new and important work.

Lord De La Warr, Parliamentary Secretary to the Ministry of Agriculture and Fisheries, has given his active support to the scheme by consenting to become the Chairman of the Committee, and the following gentlemen have been good enough to serve on the Committee:— Lord Davies, Major Ormsby-Gore, Sir Laurence Philipps, Major Sir Robert H. Green-Price, Sir Julien Cahn, Sir Charles J. H. Thomas, Sir Robert Greig, Professor A. W. Ashby, Mr. Stanley M. Bligh, Mr. H. E. Dale, Mr. Mervyn T. Davies, Dr. H. J. Denham, Mr. G. Gascoyne, Professor J. Jones Griffith, Mr. C. Bryner Jones, Principal H. Stuart Jones, Major Owen D. Jones, Mr. Alfred Mansell, Dr. J. B. Orr, Colonel W. R. Peel, Professor R. G. Stapledon, Professor R. G. White and Mr. Nevill L. Wright.

Index Veterinarius

In view of the very gratifying response to the tentative proposal that the Imperial Bureau of Animal Health should publish an *Index Veterinarius*, it has now been decided that its preparation shall immediately be taken in hand.

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The first number, covering the indexing done at the Bureau during the first quarter of 1933, will be issued some time during the summer.

Index Veterinarius is intended to be a complete index to publications relating to veterinary research, public health, administration and education.

An annual volume, which will be crown quarto in size, will run to about 1,600 pages, and a number, consisting of about 400 pages, will be issued each quarter. The *Index* will be prepared on a Gestetner duplicator; the sheets will be printed on one side only and will be clear to read. Each quarterly number will be glued and stitched, and will be well bound with a printed stiff paper cover similar to that of the *Veterinary Bulletin*.

A specimen page, made up by a random selection of a few alphabetically consecutive insertions, has been prepared and will be sent on application to those interested.

About 10,000 references will be indexed each year, each reference being suitably cross-indexed alphabetically both under the names of authors and subjects and, with cross-indexing, there will be about 50,000 insertions in a volume. All the information will be readily found, as each quarterly issue will consist of a single complete alphabetical index of authors' names and of subjects. There will, therefore, be a minimum of trouble in searching for information required.

The price is £4 per volume [four quarterly issues] including packing and postage. Orders should be sent to The Imperial Bureau of Animal Health, Veterinary Laboratory, Ministry of Agriculture and Fisheries, Weybridge, Surrey, England.

Table Poultry Production

THE large development in egg production that has taken place since the war has, naturally, been accompanied by an increase in the number of birds available for table purposes, but, unfortunately, these birds have frequently been of indifferent table quality. It is of fundamental importance that the poultry farmer should provide the class of bird that the market requires, and should prepare his produce accordingly. It has been truly said that any farm commodity of a desirable variety, well-produced and efficiently prepared for market is more than half sold. This is particularly applicable to table poultry.

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The Ministry has recently issued a Bulletin* to indicate the most efficient and economic methods of rearing table poultry. Mr. C. E. Fermor, the Manager of the Southern Table Poultry Experiment Station, Wye, has contributed the main part of the publication—that dealing with the choice of birds, their rearing, feeding, preparation for market, and marketing; and Professor Parkhurst, the late Director of the National Institute of Poultry Husbandry, has written a section devoted to the possibilities and management of battery brooders.

The prospects of an expansion of table poultry production seem to be considerable. Although home produce commands a large share of the home market, there still remains a very large proportion of imported poultry that might profitably be displaced by consistently reliable home produce, while the consumption of poultry per head of our population is still low in comparison with that of many other countries, and could be increased.

Certified Stocks of Strawberries and Black Currants

THE Ministry of Agriculture and Fisheries issues each year registers of growers whose stocks of strawberry plants and blackcurrant bushes have been examined during the growing season and found to be true to name and reasonably vigorous and healthy at the time of inspection. Certificates issued in respect of these stocks do not imply freedom from disease, but no stock is certified which is obviously unhealthy or lacking in vigour at the time of the Inspector's visit.

Arrangements are now being made for inspections during the coming season, and growers who wish their stocks to be included in the registers should write to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, for forms of application and explanatory memoranda. Applications for inspection must reach the Ministry *not later than* June 7, 1933.

Farm Crop Variety Trials

THE National Institute of Agricultural Botany extends a cordial invitation to all who are interested in agriculture to visit the Institute during the summer months. Choice of the best variety of the right crop is of vital importance to

* Bulletin No. 64, *Table Poultry Production, with a section on Battery Brooding*. Obtainable through a bookseller or from H.M. Stationery Office, price 1s. (post free 1s. 2d.)

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farmers; though it costs no more, and sometimes less, to grow the right variety instead of the wrong one, there may be as large a difference as 20 per cent. in the returns the two give. Farmers who want to assure themselves that they are growing the right varieties of cereals, sugar-beet, roots and other crops cannot do better than go to see the trials at Cambridge or one of the other centres—Sprowston (Norfolk), Good Easter (Essex), Long Sutton (Hants), Cannington (Somerset) and Newport (Salop). There they will find all the leading varieties growing side by side, including the latest introductions and others that are likely to reach the market in the near future. July is the best month. Visitors are welcome either singly or in parties, but arrangements should be made beforehand by writing to the Secretary, N.I.A.B., Huntingdon Road, Cambridge.

Instruction for Dairymen in the Handling of Milk

THE East Anglian Institute of Agriculture recently organized in those parts of Essex that are rapidly becoming urbanized a number of courses of instruction for dairymen and their roundsmen, in the handling and distribution of milk.

In districts that are developing rapidly there has been a large increase in the number of producer-retailers, and the consequent competition has resulted in keenness to give milk consumers the highest possible service. These distributors show a genuine desire to improve their knowledge of the methods of handling milk and to bring their existing plant and methods up to date.

In organizing such a course three essentials seem necessary for success: (1) the support of the Local Medical Officer of Health and Sanitary Authority; (2) personal contact between the Local Agricultural Education Authority and the retailers, producer-retailers and producers; and (3) the course should not be too long, and at the outset at any rate, should not consist of more than six lectures or demonstrations.

In the courses that have so far been arranged by the Institute the Medical Officer of Health in each area concerned has placed at the disposal of the Institute, free of charge, a room suitable for instruction, and has also undertaken to distribute leaflets, postcards, etc., advertising the course to all registered retailers in the district, and to other people who might be interested.

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The Institute prepared the syllabus, supplied the lecturers and demonstrators, and arranged for the printing of advertising matter. The syllabus that has been followed in most cases has been distributed over six meetings as follows:—

- (1) Milk—its feeding value and composition.
- (2) Pasteurization and graded milks.
- (3) Milk testing.
- (4) Clean milk production.
- (5) Bacteriological tests and interpretation of results.
- (6) Handling milk on the round.

In all instances the lectures were very well attended, the average attendance at a course held at Grays being approximately 100.

This form of instruction is relatively inexpensive and seems to be both greatly needed and appreciated in these areas of rapidly-increasing population.

Instruction in the Care and Maintenance of Farm Tractors

TRACTORS are now recognized as an essential part of the equipment on most arable farms of average size, and the number of tractors used will probably tend to increase in the arable counties. Many tractors are operated by farm workers who know very little about the construction and maintenance of the machine in their charge, and this is apt to result in heavy repair bills and numerous stoppages for minor faults and adjustments.

In response to a request from the Steeple Bumpstead Agricultural Discussion Society for technical instruction in tractor maintenance, a course was arranged by the East Anglian Institute of Agriculture, Chelmsford, in conjunction with the Society. The members of the Society selected for the course lads who were fairly certain to make full use of the instruction they received, and in this way a class of eleven was obtained. Owing to the limited facilities available for instruction, the numbers had to be restricted, and one or two applications had to be refused.

The course started early in January and was held on each Monday afternoon for ten weeks in a covered yard on a farm conveniently situated. The instruction was given by Mr. R. P. Hawkins, B.Sc., District Agricultural Organizer for north-west Essex, and a tractor was lent by the local agents for demonstration purposes. Full use was also made of charts and instruction books to enable the members of the class to gain an insight into the working and construc-

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tion of makes of tractor other than the one actually dismantled.

The course dealt with the various parts of the tractor, their construction and adjustment, and in general aimed at showing the members of the class how a tractor works and how to maintain it in good running order.

The members of the Discussion Society were so pleased with the course and with the interest taken that they have decided to hold a Tractor Ploughing Competition later in the year and to include a class for those who attended the course.

The success of the course was largely due to the support it received from the members of the Agricultural Discussion Society, who not only selected the right type of lads, but allowed them to attend the classes during working hours.

Importation of Cherries

The following Press notice was issued on May 10:—

WITH the object of preventing the introduction of the Cherry Fruit Fly, the Minister of Agriculture and Fisheries has made an Order under the Destructive Insects and Pests Acts, 1877 to 1927, regulating the importation of cherries into England and Wales during the 1933 season.

Cherries grown in France will be admitted without restriction until May 27, after which date importation will be prohibited except of cherries grown within a small district around Honfleur. The limits of this district are defined in the Order.

Cherries grown in Italy will be admitted without restriction until June 5, after which date only those grown in the Region of Emilia will be allowed to enter; after June 16 the importation of cherries grown in any part of Italy will be entirely prohibited.

Cherries grown in Germany will be admitted until June 26 if accompanied by a certificate of origin; after that date no German cherries will be admitted except those certified not to have been grown south of latitude 53° N. or in East Prussia.

Certificates of origin must accompany cherries grown in any other European country which are imported after May 27.

Copies of the Order may be obtained from H.M. Stationery Office, price 1d. net.

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Register of Dairy Cattle

VOLUME XVI of the Register of Dairy Cattle has just been published. It contains particulars of 553 cows in respect of which Certificates of Merit have been awarded by the Ministry since October 1, 1932. This compares with 514 cows entered in the previous Volume. To be eligible for a Certificate of Merit a cow must have given during a period of three consecutive Milk Recording Years not less than the prescribed yield of milk, and must normally have calved not less than three times during those years. The prescribed yields for the three-year periods are 30,000 lb. for Friesians; 27,000 lb. for Ayrshires, Blue Albions, Lincoln Red Shorthorns, Red Polls and Shorthorns; 24,000 lb. for all other breeds or types except Dexters; and 21,000 lb. for Dexters.

A statement is given showing the number and distribution of the yields of the cows of the various breeds entered in the Register, and the highest yield certified for each breed for the three years ended October 1, 1932. Of the cows entered, 6 gave over 50,000 lb. of milk during the three years concerned; 23 over 40,000 and under 50,000 lb.; 65 over 35,000 and under 40,000 lb.; 183 between 30,000 and 35,000 lb.; 171 between 27,000 and 30,000 lb.; and 67 between 24,000 and 27,000 lb.

Particulars are also given of pedigree bulls of proved milking strain. The condition of entry of a bull in the Register is either (*a*) that its dam and sire's dam have given the standard yield prescribed for their breed or type in any particular Milk Recording Year, or (*b*) that it has two or more daughters that have given not less than the standard yield prescribed for their breed or type in any particular Milk Recording Year. Entries relating to 30 bulls are given in the Volume, 28 of which qualified under condition (*a*) and 2 under condition (*b*).

A list of the Milk Recording Societies of England and Wales, with particulars of each Society and the name and address of its Secretary, is included in the Register.

Dairy farmers and others desirous of acquiring high-yielding milk-recorded cows that have been regular breeders should find the Register a valuable book of reference.

The Register is priced 9d. and can be obtained from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or through any bookseller. A copy of the Volume is issued free to all members of Milk Recording Societies.

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The Housing of Poultry

IN the initiation of any poultry enterprise housing must necessarily account for a large proportion of the capital outlay, and careful planning is important on this ground alone. Capital, however, is not the only consideration where the housing of poultry is concerned; the quality of the accommodation provided for the stock has a material and continued influence making for success or failure. Low egg production, outbreaks of disease, and unsatisfactory growth are frequently the results of badly designed or ill-constructed houses, and such houses have, in the long run, to be replaced or altered, thus involving expenditure that might have been avoided.

As a guide to the building of modern poultry houses, the Ministry has recently issued a Bulletin* giving detailed instructions for the erection of houses of all types. This publication, which has been written by Mr. I. Rhys, of the National Institute of Poultry Husbandry, Harper Adams College, deals with the whole subject from the selection of site and materials to the construction of various equipment such as hoppers and water-stands, and the text has been freely illustrated by means of working drawings and photographs. The Bulletin also contains 8 folding sheets of plans and detailed drawings of different types of houses.

Register of Poultry Breeding Stations

THE Ministry has issued a Register of Accredited Poultry Breeding Stations for the information of poultry keepers who desire to obtain breeding stock, day-old chicks and eggs for hatching from healthy, well-bred poultry of high economic quality. The Stations are accredited by county authorities for agricultural education under a scheme drawn up by the Ministry. The scheme is in operation in seventeen counties in England and Wales, and provides that poultry breeders are only accredited by the county authorities after an official inspection by the authority, and after the stock has passed the agglutination test prescribed by the regulations. The accredited stations are also subject to further inspection from time to time on behalf of the county authority and by officers of the Ministry.

This Register should be of material assistance to poultry

* Bulletin No. 56, *The Housing of Poultry*. Obtainable through a bookseller or from H.M. Stationery Office, price 2s., by post 2s. 4d.

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keepers as an indication of reliable sources from which they can obtain stock with the minimum of risk as regards disease and with a reasonable measure of security as regards the quality of the parent stock. The scheme is at present only in its initial stage, and it is hoped that other counties which are considering the matter will be included in the Register another year. A copy of the Register and fuller particulars of the scheme can be obtained, free of charge, on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Wheat Precision Observations

In the March issue of this JOURNAL, reference was made to the scheme of observations on the development of the wheat crop, which is being carried out under the auspices of the Agricultural Meteorological Committee, and a short account was given of the first quarter's observations on wheat crops sown last autumn. The following is a summary of the second quarter's observations on the same crops.

The principal event to be dated in the second quarter of the wheat crop's growth is *tillering*, arbitrarily defined as the moment when the ratio shoot-number/plant-number passes the ratio 2:1.

Four observations at weekly intervals designed to fix the date of tillering serve equally to determine its rate. The number of tillers formed at this time per 100 plants per week is therefore given as a measure of tillering rate. The fifth column of the Table appended gives comparable values for the plant density at the date of tillering, which is believed not to differ greatly in ordinary circumstances from the plant density for the rest of the year. The shoot density at tillering is, of course, exactly twice the plant density.

The last column gives comparable figures for shoot density at a fixed date, April 15.5, fifteen weeks from the beginning of the year.

The stations are given in order of sowing date. At tillering, two changes of order have taken place, Seale-Hayne, sown six days later than Woburn, and appearing above ground about five days later, is more than two days ahead at tillering. Again, Sprowston was sown two days later than Bognall, appeared above ground three days earlier, and tillered seven days earlier.

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The dates of tillering are much more unequal than those for sowing and appearance above ground. The range for sowing is 45 days, for appearance above ground about 60 days, and for tillering 89 days. At the two earliest stations, both standard varieties had tillered before the end of the year. At Rothamsted, Yeoman tillered on January 18, just before a cold spell that delayed Squarehead's Master until February 4. No other station tillered before March, and at only one of them, Long Sutton, was there any considerable interval between the two standard varieties.

The low rates of tillering of Victor at Seale-Hayne, and Yeoman at Rothamsted, indicate the check to shoot formation during the colder weather in the second half of January. A series of cool nights towards the end of March may likewise be responsible for the low rates at Long Sutton. The highest values in the Table, such as those at Boghall, show that plants active in shoot formation will form them at the rate of one in 12 to 14 days. This rate, moreover, at least in the early stages, is not prevented by a high plant density.

Tillering falls near the end of the period over which plant number can be counted. A comparison of the plant densities in the Table with those for the first count recorded (this JOURNAL, Vol. XXXIX, p. 1083) shows that the apparent plant elimination up to tillering is not often more than 20 per cent. The true value, however, is probably higher, since some real elimination must be masked by the appearance of late germinating plants. Apparent plant elimination before tillering was greatest at Woburn, about 42 per cent., and at Long Sutton, about 22 per cent. At Newport, there was 45 per cent. elimination of Yeoman on a very sparse crop, while Squarehead's Master lost only 19 per cent. At Seale-Hayne again, on a very dense crop, Yeoman suffered an apparent loss of 23 per cent. and Squarehead's Master only 3 per cent. It is possible therefore that Squarehead's Master is more reinforced by late germinations.

The values for shoot number at a fixed date, unlike the values in other columns, do not represent the same stage in the development of the crop. Thus at the four earlier stations shoot number was already falling, while at the four later stations it was still rising, at April 15.5. Estimates of the date and density at maximum shoot number

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will be included in the report for the third quarter. At the fixed date chosen, the shoot density was uniformly greater with Yeoman than Squarehead's Master, the only exception being the sparse crop at Newport.

SAMPLING OBSERVATIONS ON WHEAT, 1932-33, SECOND QUARTER.

Station	Variety	Tillering			Estimated shoot n'mb'r per 32 metres at April 15.5
		Date	Rate. (Tillers per 100 plants per week)	Density. (Plant n'mb'r per 32 metres)	
WOBURN Bedfordshire	Squarehead's Master Yeoman	Dec. 29.91	22'4	1,027	3,641
		Dec. 29.28	41'0	1,209	4,288
SEALE- HAYNE Devonshire	Squarehead's Master Yeoman Victor	Dec. 26.89	40'2	1,547	3,438
		Dec. 27.20	33'9	1,578	4,074
		Jan. 28.35	16'4	809	2,175
ROTHAM- STED Hertfordshire	Squarehead's Master Yeoman Victor	Feb. 4.30	40'3	1,363	4,011
		Jan. 18.26	11'5	1,432	5,197
		Feb. 8.76	37'2	1,247	3,834
WYE Kent	Squarehead's Master Yeoman	Mar. 5.68	50'6	1,015*	2,585*
		Mar. 6.48	41'0	1,130*	3,151*
NEWPORT Shropshire	Squarehead's Master Yeoman	Mar. 18.56	53'6	591†	2,336†
		Mar. 20.40	49'2	368†	1,842†
BOGHALL Edinburgh	Squarehead's Master Yeoman	Mar. 27.09	56'7	1,555	4,905
		Mar. 28.67	53'5	1,540	5,057
SPROWSTON Norfolk	Squarehead's Master Yeoman	Mar. 21.33	43'3	1,317	3,096
		Mar. 20.06	45'2	1,362	3,890
LONG SUTTON Hampshire	Squarehead's Master Yeoman Wilhelmina	April 1.25	21'6	1,075	4,217
		Mar. 24.26	30'9	1,468	5,418
		Mar. 31.19	23'5	1,229	4,890

* Based on samples of three instead of four rows.

† Based on five instead of eight blocks.

* * * * *

DUSTING FOR PEST AND DISEASE CONTROL IN THE UNITED STATES AND CANADA

F. R. PETHERBRIDGE, M.A.,
School of Agriculture, Cambridge.

DURING April, May and June of 1931, the writer paid a visit to a number of fruit districts in the United States and Canada in order to study local pest-control methods. For a number of years, great interest has been taken in the application of dusts as a means of controlling certain pests and diseases.

Before dusting could compete satisfactorily with spraying on a large scale, special machines were necessary. Manufacturers have been stimulated to produce such machines, and there are now on the market various power-dusting machines capable of covering large trees with dust, under calm conditions, and of dusting large acreages quickly and satisfactorily. Under favourable conditions some of the larger machines will cover 100 acres of oranges in a night. The machines are driven between the rows as in the case of travelling spraying outfits, and dust two half rows at once. For the past few years, several companies have carried out dusting by means of aeroplanes, but although these are capable of covering 40 acres of citrus trees per hour their use is decreasing. This is probably because conditions during the daytime are not so favourable for dusting as at night, when the ground machines are used.

The following three main classes of dusts are used:—

(1) **Sulphur Dusts.**—These are mostly proprietary products and may consist chiefly of (a) sulphur that has been reduced to such a degree of fineness as to permit 98 per cent. to pass through a 300-mesh screen, (b) sulphur-arsenate dust, composed of powdered arsenate of lead (about 10 per cent.) and powdered sulphur. As powdered sulphur is readily washed off the trees numerous attempts have been made to increase the adhesion of dusts by the addition of various materials. More recently it has been found that Banks Colloidal Sulphur (= Bentonite-sulphur) increases the sticking power of sulphur dust. (Bentonite-sulphur is prepared by fusing sulphur into bentonite, with which it has been previously blended.)

These sulphur dusts are used in the control of Apple

DUSTING FOR PEST AND DISEASE CONTROL

Scab and other fungoid diseases, and also against certain insects and mites.

(2) **Copper Dusts.**—These are made chiefly from sulphate of copper and lime. The best known is copper-lime dust, which is a mixture of one part of finely-ground anhydrous copper-sulphate and eight parts of hydrated lime. These are chiefly used in the control of Potato Blight (*Phytophthora infestans*) and certain other fungoid diseases of potatoes and vegetables. When biting insects, such as caterpillars, are present, a poison (usually an arsenate) is added to these dusts.

(3) **Nicotine Dusts.**—These are made from an inert carrier and varying percentages of nicotine sulphate* or nicotine, and are used as contact insecticides against such pests as aphides and capsids.

The Use of Dusts against Apple Scab.—Numerous experiments, to compare the value of dusting with spraying as a means of reducing Apple Scab, have been carried out in the United States and Canada. In recent years, sulphur dusts have mostly been used, because it was found that copper dusts were apt to cause serious russetting of the fruit of some varieties. The various sulphur dusts have been compared with lime-sulphur solution, as the latter is the usually recommended spray. Sulphur dust alone has not proved as reliable as a sulphur dust containing a sticker. Contrary to expectation, dusting *before rain* has given better results than dusting *after rain*.

In many of these experiments, dusting has given very similar results to those given by lime-sulphur spraying. Occasionally, the results from dusting have not been as good as those from spraying and, on rare occasions, dusting has failed almost entirely to control Scab. It has been suggested that bad timing of the pre-blossom applications of dust was responsible for this failure. These experiments suggest that the best sulphur dusts, when carefully applied, are capable of controlling Scab, but cannot be entirely relied upon unless the dusting is very carefully timed. More dustings than sprayings are required for Scab control, and some observers suggest two dustings as a substitute for one spraying.

* In America the nicotine used in dusts and sprays is usually in the form of nicotine sulphate and not free nicotine, which is the form in which it is normally used in England. In American literature, the term nicotine usually implies nicotine sulphate.

DUSTING FOR PEST AND DISEASE CONTROL

In the Eastern States and Eastern Canada, where Scab control is a very serious problem, dusting has attracted much attention.

In Ontario, in the spray calendar for apples for 1931, drawn up by L. Caesar, J. E. Howitt, W. A. Ross and G. C. Chamberlain, the following note on dusts is found:—"Dusting is satisfactory as a supplement to spraying in large orchards, but we do not feel safe in recommending it as a substitute for the liquid spray. If so used, apply at the same times as indicated for the liquid spray but in wet weather give extra applications. Dust when the air is calm, late in the evening or early in the morning."

At the Ontario Agricultural College, at Guelph, I obtained the following information:—

Dust is a good supplement to spraying. There are probably not a dozen growers in the Province who rely on dusting alone. A dusting machine is a good thing to have in rainy weather. If the apple trees are sprayed before blossoming, then dusting will usually keep them clean afterwards.

The New Jersey Agricultural Experiment Station, in their spraying recommendation for 1931, say:—"The dusting of apples is only recommended as an adjunct to spraying, since observations and experiments have clearly demonstrated that dusting is not as effective as spraying, but may be of great value when unfavourable weather conditions or inadequate equipment make it impossible to apply proper sprays at the proper time."

In the *Virginia Apple Spray Programme*, no mention of dusting is made and spraying with lime-sulphur is recommended for Scab.

At the *Geneva Experiment Station, New York State*, Prof. Parrott gave this information:—"The number of growers who depend entirely on dust is decreasing. Not more than 1 per cent. of the growers in New York State rely entirely on dust, but the number who use it in a supplementary capacity is increasing."

From *Dr. Chapman*, I obtained the following information:—"In Massachusetts, there is a 90 per cent. 'clean apple club.' Sixty growers make this grade, but none of these sixty relies entirely upon dust, although a few use it in a supplementary capacity."

At *Cornell University*, spraying is preferred to dusting, and the latter is regarded as being supplementary to the

DUSTING FOR PEST AND DISEASE CONTROL

former. Where the acreage is sufficient to warrant the purchase of two machines a dusting machine is recommended as a quick method of covering the foliage in wet weather. Some years ago a number of growers used only dust to control Apple Scab, but now very few of these rely entirely on dust.

In *Maine County*, 30 per cent. of the growers used only dust for the control of Apple Scab in 1924, but now none of them relies entirely on dust.

In the *State of New York*, I visited two growers who had relied on dust alone for pest and disease control. One of these, whose orchards are situated near Rochester, has now gone back to spraying, but uses dusts in an emergency such as obtains when wet weather prevents spraying, and it is important to get the trees covered very quickly. He showed me trees, 70 years old with a spread of 45-50 feet; one of these trees had a trunk 7 ft. 9 in. in circumference and was about 30 feet high. He had obtained 45 barrels of 48 lb. each per tree. Another grower, whose plantations are situated near Lockport, had relied on dusts for nine years. Last year he had 3 per cent. of culls. He is quite satisfied with dust, but his trees were not quite so clean as the sprayed trees previously seen.

In the drier parts of the Western States, where the fruit is irrigated, Apple Scab is not a serious trouble. In districts like Wenatchee and Yakima, in the *State of Washington*, it would be difficult to include sulphur dusting in the spraying programme because of the number of applications of summer mineral oils which are made for the control of Codling Moth. It is very risky to alternate these with sulphur dusts, except at intervals of three weeks, because of the injury that may result.

In the wetter parts of *Oregon*, where weather conditions approximate nearer to those found in this country, Apple Scab is troublesome. The Oregon State College extension service, in their Orchard Protection Programme for 1931, say:—

“In cool, moist, spring weather dusting has not proved as effective as the usual liquid sprays for such a trouble as *Apple Scab*. No practicable dusting method for the control of such diseases as apple tree anthracnose or peach blight has so far been demonstrated in Oregon.”

Dusting with finely-divided sulphur prepared for orchard use has given good results, where properly applied in *warm*

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weather, for the control of such troubles as Brown Rot and Powdery Mildew.

In England, some of the special sulphur dusts have, in some cases, given good results against Apple Scab, but in others the results have been inferior to those from spraying.

Some growers are satisfied with the results of dusting after blossoming when the trees have previously been sprayed during the pre-blossom period.

Sulphur dusting gives a poor control of Red Spider as compared with lime-sulphur spraying.

Sulphur dusting may cause leaf-fall and loss of crop with varieties like Lane's Prince Albert. In one instance, the crop of this variety was very much reduced by sulphur dusting as compared with the crop on trees that were sprayed with lime-sulphur and lead-arsenate before blossoming and twice with lime-sulphur (1 in 100) and lead-arsenate after blossoming. Some proprietary and other sulphur dusts give a very satisfactory control of American Gooseberry Mildew (*Sphaerotheca mors-uvae*) at a lower cost than spraying with lime-sulphur.

Some growers in the Wisbech area are satisfied with the results of dusting with copper-lime dust on the variety Bramley's Seedling. Where this dust is used, Red Spider is likely to thrive.

The Use of Dusts against Insect Pests.—In the Eastern States of the U.S.A., attempts have been made to control insect pests on fruit trees by means of nicotine dust and by the addition of an arsenical dust to the fungicide. Most of the advisory officials and growers are of opinion that a programme consisting entirely of dusting is not very satisfactory for controlling insect pests, and that dusting is not as good as spraying where insect pests are prevalent.

Dusting does not give a satisfactory control of such pests as Codling Moth, European Red Mite (our Fruit Tree Red Spider, *Oligonychus ulmi*), the caterpillars of the Leaf Roller and San José Scale. It gives a satisfactory control of the Green Apple Bug (a member of the same family as our Apple Capsid Bug).

In the West, dusting for certain pests of Citrus trees is common.

California.—According to the California Fruit Growers' Exchange, sulphur dusting, for the control of certain pests of Citrus trees, has increased greatly during the last three years, particularly in Central Northern California, and to

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a lesser extent in the Redlands Riverside district. Mr. E. A. McGregor, of the U.S. Bureau of Entomology, has shown that repeated applications of finely-ground sulphur dusts are very satisfactory in the control of Citrus Thrips. His recommendation of three dustings is now advised.

In addition, three dustings, properly-timed, have in some cases resulted in commercial control of Citricola Scale; but other orchards, dusted three times, have not been commercially cleaned. There is no evidence that sulphur can be depended upon to control moderate or heavy infestations of Citricola Scale under average temperature. When sulphur dust is present on the leaves, there is a high mortality of "crawlers" but those established are not readily killed. To be most effective, sulphur requires temperatures from 80° F. to 100° F. When temperatures exceed 100° F. there is danger of burn.

Sulphur dusts are also recommended for the control of *Citrus Mite* (our Fruit Tree Red Spider, *Oligonychus ulmi*) in the interior; but in the coastal area results have not been generally dependable, on account of the cooler temperatures.

Summary.—The use of aeroplanes for dusting citrus trees is decreasing in California.

The sticking power of sulphur dusts is increased by the addition of a certain percentage of Bentonite-sulphur.

In many experiments these sulphur dusts have given a good control of Apple Scab, but occasionally poor results have been obtained. As they cannot always be relied upon, they are regarded chiefly as a useful supplement to spraying, especially when weather conditions are unfavourable. If dusting is relied upon entirely for the control of Apple Scab, very careful timings of the pre-blossom applications are necessary. Dusting *before rain* has given better results than dusting *after rain*. When applied in warm weather, these dusts give a good control of Brown Rot and Powdery Mildew.

When sulphur dusts are alternated with mineral oil sprayings, intervals of three weeks are necessary, as otherwise scorching may result.

Sulphur dusts are recommended in California for the control of Citrus Thrips in districts where high temperature conditions obtain. They do not give a satisfactory control of our Fruit Tree Red Spider except when temperature conditions are much higher than in this country.

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Copper dusts (and especially copper-lime dust) are used in the control of Potato Blight, and certain other fungoid diseases of potatoes and vegetables.

Nicotine dusts containing nicotine sulphate or nicotine are used against such pests as aphides and capsids.

THE KESTREL

W. P. PYCRAFT.

OVER large areas of Great Britain, the Kestrel (*Falco tinnunculus*) is now the only member of the hawk tribe that may be seen almost every day in the year. Those who live in the country know it well, but others may distinguish it at sight, even when seen at large for the first time, by its habit of checking flight and remaining suspended in mid-air as it surveys the ground below for sight of prey, motionless save for the rapid vibration of the wings and tail. Hence its other name, the "Windhover."

Although commonly called a hawk, the bird is really one of the falcon tribe, of which the Peregrine, Merlin and Hobby are other members still to be found in the wilder parts of the country. These, and several other larger species, were known as "long-winged hawks" in the ancient days of falconry, but that sport, then the best means of securing various wild birds for the table, languished after the introduction of firearms, although, in recent years, there has been a revival of this ancient sport for its own sake.

Description and Habits.—The kestrel does not build a nest, but is content to scratch a hollow on the ledge of a cliff, to make use of old nests of the magpie and crow, or else a squirrel drey. Sometimes it will utilize a hollow tree or some place of lodgment in a church tower or in a windmill. The eggs, four to six in number, are laid between mid-April and mid-May. They bear dark red-brown blotches on a more or less obscured ground of creamy- or yellowish-white. Both parents share the task of incubation, which lasts about 28 days, the female, however, taking the larger part.

The females of the hawk-tribe are usually larger than the males, but with the kestrel the disparity is very small, the female having a length of about 14 in. as against about 13 in. for the male.

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The sexes can be readily distinguished by their coloration. In the male, the head and neck, lower part of the back, and the tail, are of a bluish slate-grey, the tail being further marked by a terminal band of black edged with white. The upper part of the back and the wing-coverts are of a pale chestnut spotted with black; and the under-parts are of a pale buff, tinged with rufous and spotted and streaked with black. The bare skin round the eye, the "cere" over the base of the bluish beak, and the legs and toes, are yellow. The female differs conspicuously in having the head and neck chestnut-red streaked with black; the back and wing-coverts heavily barred with black; and the tail of a pale chestnut-red barred with black. In very old females, the tail may display a tendency towards the bluish-slate colour of the adult male.

Immature birds resemble the female but are more heavily barred. The nestling develops two successive coverings of white down-feathers before the appearance of the true feathers. The second generation of down feathers is finally thrust out adherent to the tips of the first generation of typical feathers, known as "juvenile plumage."

Food of the Kestrel.—It is a regrettable fact that few seem to be aware that the kestrel, in common with all other birds of prey, ejects from the mouth solid castings or pellets, from which an accurate record of the diet may be obtained. The pellets, as large as a walnut but more elongated, can always be found under the roosting tree or in the neighbourhood of the nest; and, if broken up, will be found to consist of a mass of felted hair enclosing broken bones of field mice, young rats and voles, also the shards or wing-cases of beetles, many of which are of species injurious to crops. Occasionally, caterpillars and the bones and feathers of some small finch may be found.

Had the diet of the kestrel, and the other falcons mentioned, been better understood, they would not in the past have been regarded as "vermin" and relentlessly destroyed for alleged ravages on game-preserves. Among the more understanding estate owners and experienced gamekeepers, it is realized that the policy of extermination is not justified; and, where a more enlightened attitude prevails, kestrels have been allowed to nest in the immediate neighbourhood of the coops where pheasant



The Kestrel or Windhover. From a drawing by G. E. Lodge.

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chicks were being reared, and seldom has a chick been taken. The kestrel's real attraction to the rearing-field is furnished by the mice which gather there to eat the scattered grain. On rare occasions, probably because other food was scarce, or, accidentally, in mistake for normal prey, a chick may have been snatched up, but there has been little foundation for the charges of *havoc* wrought among chicks of hand-reared game. A kestrel, having taken a chick, may develop a liking for them and make repeated visits but, where an understanding attitude prevails, the marauder is regarded as a "rogue" and shot, and no complaint can be made about putting an end to such depredations.

Value to Agriculture.—There is, however, no justification for the policy of ruthless extermination. Despite an occasional lapse in the matter of game chicks, the kestrel, on balance, is of inestimable value to farmer and game preserver alike, since the bulk of its food consists of mice, young rats, voles and many beetles injurious to crops.

Having regard to the immense amount of damage done to cornstacks by rats and mice, the destruction of kestrels is an act of folly. The annual loss due to rats alone in this country is estimated at fifteen million pounds sterling, yet the slaughter of kestrels and owls, the inveterate enemies of the rat, has not altogether ceased. Ignorance of the diet and habits of these birds may be the reason, but to their destruction must be attributed, in some measure, the periodical over-running of large areas by voles, which appear in millions, as in the great vole plague from which parts of Scotland suffered in 1892, causing most serious injury to the grass land.

With a greater appreciation of the amenities of the countryside, there is a steadily-growing conception of our responsibility in regard to the wild-life of our islands, especially as regards its economic importance. In short, we are realizing that we are trustees for posterity, and that it is our bounden duty to hand on to those who come after us the heritage that is ours to-day, as far as this is possible. Our native birds and beasts—plants, too, for that matter—must be as jealously preserved as our ancient monuments, and for the same reason.

CONSUMERS' PREFERENCE: BEEF WEIGHTS AND PRICES

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THE object of this inquiry was to discover the extent to which the feeder is turning out cattle at the weights preferred by the consumer, as reflected in the higher prices paid.

Prices and weights of fat beasts were taken over a period of ten consecutive markets in Norwich commencing April 11, 1931, and in Rugby, commencing August 10, 1931.*

Thus, the inquiry fell within the periods of maximum supply of each market, for yard cattle at Norwich and for grass-fed cattle at Rugby. These two markets are representative of large supply and of high quality. The Shorthorn breed was most numerous in each market, though in Norwich, Red Polls approached nearly to Shorthorns in number and there was also a fair quantity of Aberdeen-Angus. In Rugby, apart from Shorthorns, which were in by far the largest quantity, there was about an equal head of Herefords, North Devons and Welsh Runts, with fewer Aberdeen-Angus. Almost every breed was, however, represented at some time during the inquiry, including Highland cattle, Friesians, Longhorns and Dexters.

Weights were recorded by hundredweight. The buyers, however, rarely glanced at the weighbridge. They estimated, as well as bid, the beast's value per "head." In the tables that follow, the hundredweight group is used as the basis of discussion, and, in each case, represents the half-hundredweight preceding and succeeding the numeral. For example, the range of the 9-cwt. group is from $8\frac{1}{2}$ to $9\frac{1}{2}$ cwt.

No useful comparison can be made as between prices, or price trends, in Norwich and Rugby, as the inquiry was made at different seasons for each market.

The total number of fat bullocks and heifers of which particulars of weight and price were taken over the ten markets was, for Norwich, 4,693, and for Rugby, 4,223. These figures represent about 90 per cent. of the good-

* These prices have no bearing on those prevailing to-day, owing to the general fall, but they serve the purpose of the inquiry as measures of consumers' preference.

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conditioned cattle on offer. In the following Table they have been classified by weight:—

TABLE I.—NUMBERS AND PERCENTAGE OF TOTAL OF FAT CATTLE IN NORWICH AND RUGBY MARKETS FOR WHOLE PERIOD, GROUPED BY WEIGHT.

Norwich			Rugby		
Weight Group	Number	% of Total	Weight Group	Number	% of Total
Cwt.			Cwt.		
7	353	7.5	7	31	0.7
8	864	18.4	8	326	7.7
9	1,139	24.3	9	811	19.2
10	914	19.5	10	1,174	27.8
11	655	14.0	11	1,112	26.4
12	489	10.4	12	609	14.5
13	228	4.8	13	146	3.4
14	51	1.1	14	14	0.3

The maximum numbers in Norwich occurred in the 9-cwt. group, and in Rugby in the 10-cwt. group. In Norwich, however, 25.9 per cent. of the total was made up of the 7-cwt. and 8-cwt. groups, which was represented at Rugby by only 8.4 per cent. Clearly, the yard feeder is at an advantage over the Midland grazier in finishing his cattle at the light weights that are now in demand, though both in Norwich and in Rugby, farmers and buyers agreed that there had been a consistent movement towards meeting this demand.

To consider, now, the consumers' preference, as disclosed in prices. The following Table shows the relation between the weight of cattle, and the price per hundredweight:—

TABLE II.—AVERAGE PRICES PER WEIGHT GROUP, NORWICH AND RUGBY MARKETS, OVER WHOLE PERIOD.

Norwich		Rugby	
Weight Group	Price per cwt.	Weight Group	Price per cwt.
Cwt.	£	Cwt.	£
7	2.56	7	2.14
8	2.48	8	2.08
9	2.44	9	2.04
10	2.38	10	2.03
11	2.36	11	2.01
12	2.31	12	2.00
13	2.31	13	1.97
14	2.28	14	1.93

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In both markets, the highest prices were paid for the lightest weights. Prices in Norwich were markedly higher in the 7-cwt. to 9-cwt groups, and in Rugby in the 7- and 8-cwt. groups, than they were for the heavier groups; and, in each case, the 7-cwt. group, the lightest in which cattle were offered in sufficient quantity for comparisons, fetched the highest price. In Norwich, from the 10-cwt. group to the 13-cwt. group, and in Rugby, from the 9-cwt. group to the 13-cwt., prices fell very little, though consistently.

The maximum number of cattle on offer did not coincide in either market with the maximum price. The bulk of the cattle, however, were offered in a small range of weight groups that fetched an almost level price, second to the prices of the very light beef, and feeders generally felt they were practically justified in producing these middle-weight beasts even though they fetched something less than the maximum price. In this connexion, the difference in price, per cwt., between light-weight and heavy-weight beasts was about 3s. Assuming 12-cwt. beasts to have sold as well as the 8-cwt. class they would have fetched about 36s. per head more than they actually realized.

The yard-feeding practised in the Norwich area makes possible the production of "baby" beef. This realized a high price, and constituted an alternative optimum to 10-cwt. beef. "Baby" beef, although not offered in large quantity, was sufficient to attract buyers of this type of beef to the market. The grass-feeding of the Rugby area, on the other hand, is not well adapted to "baby" beef production. Very little was shown, although there was a keen demand for it. The Midland graziers, in fact, have the season's grass to eat, and gave the impression that producing lighter than 10-cwt. beef was not making the fullest use of their grazings. They were happier meeting a demand for 12-cwt. beef.

The preference for bullocks or heifers for beef production shows a marked difference in the grazing as contrasted with the yard-feeding districts (see Table III).

Taking each market of the series, the maximum head of heifers occurred in a group 1 cwt. lighter than the maximum head of bullocks, although in Rugby, as totalled by weight groups, the maximum number of heifers fell in a group 2 cwt. lighter than the maximum number of bullocks.

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TABLE III.—NUMBERS OF BULLOCKS AND HEIFERS
PER WEIGHT GROUP.

Norwich			Rugby		
Weight Group	Bullocks	Heifers	Weight Group	Bullocks	Heifers
Cwt.			Cwt.		
7	253	120	7	4	27
8	701	163	8	39	287
9	1,008	151	9	166	645
10	841	75	10	548	626
11	619	36	11	846	266
12	480	9	12	544	65
13	221	7	13	135	11
14	51	—	14	15	1
	4,154	559		2,295	1,928

It is difficult to explain why the numbers of bullocks offered in Norwich were so far in excess of the number of heifers, while the numbers of bullocks and of heifers in Rugby differed but little. To some extent it may be due to the fact that the Norwich feeders, procuring their stores from areas where dairying is important, would find it easier to get bullocks than heifers for fattening. On the other hand, the presence of a large number of Red Polls shows that importation from distant parts of the country was not the sole source of supply for the Norfolk feeder. There is a great deal of dairying in the Rugby neighbourhood, and a more even ratio of bullocks and heifers was to be expected. But here again, importation of stores was important, and a very considerable proportion of these consisted of heifers. Heifer stores, however, were represented usually by beef breeds, such as Runts, Herefords and Aberdeen-Angus, not by dairy breeds. The recurring freshening periods of heifers make them less suitable for yarding than bullocks.

Light-weight heifers sold better than light-weight bullocks, both at Norwich and Rugby, while, from 9 cwt. upward, bullocks sold better than heifers, as shown in Table IV (page 222).

In Norwich, the consistently higher price of heifers is due to the fact that by far the greater part of the heifers on offer were of "baby" beef weights and fetched the highest price. Taken by cwt. groups, both in Norwich and

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TABLE IV.—AVERAGE PRICES PER CWT. OF BULLOCKS AND HEIFERS IN NORWICH AND RUGBY MARKETS BY WEIGHT GROUPS.

Norwich			Rugby		
Weight Group	Bullocks	Heifers	Weight Group	Bullocks	Heifers
Cwt.	£	£	Cwt.	£	£
7	2'53	2'62	7	1'99	2'16
8	2'47	2'52	8	1'94	2'10
9	2'43	2'45	9	2'05	2'04
10	2'46	2'33	10	2'06	2'00
11	2'37	2'24	11	2'05	1'89
12	2'32	2'06	12	2'03	1'80
13	2'32	1'95	13	1'98	1'75
14	2'28	—	14	1'95	1'75

Rugby, after the 9-cwt. group the price preference was for bullocks, owing to some extent at least, to a doubt whether the heavier heifers were "maidens."

Four auctioneers were selling beef simultaneously in Rugby market. Some specialization of trade, as revealed by price, occurred with respect to light- and to heavy-weight cattle. The firm which secured the highest prices for "baby" beef, received the lowest for heavy beef, and those getting low prices for "baby" beef got high prices for heavy beef. The number of beasts thus dealt in was small, compared with the numbers in the 9- to 12-cwt. groups, for which similar prices were received in each auction.

Influence of Supplies on Prices.—Analyses of the variations in numbers of stock sold, and of prices from week to week, do not indicate that an unusually large or small head of stock on offer affected the prices realized per cwt., although the variations might extend to halving or doubling the supply in successive markets.

In order to make certain that the price variations revealed in Norwich and Rugby markets were not associated with variations in the numbers of cattle on offer, the prices in a number of other large markets similar in character to Norwich and to Rugby, as reported in the Ministry of Agriculture's *Agricultural Market Report*, were plotted in conjunction with those of Norwich and Rugby. In all cases, the price-trends were parallel. Both Norwich and Rugby offer beef far in excess of local requirements, this

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excess going chiefly to London and the Midland towns. Conditions of demand in these distant consuming centres, and not the fluctuations of local supply fix the prices for each market. The situation seems to be, that retail butchers and catering firms in the large towns make known their immediate requirements to the wholesale and commission buyers who attend the markets. These wholesale dealers, in conversation, confirmed the impression, derived from analysis of material collected, that the particular requirements of the retailer and caterer in the large towns, make to-day's market price in Norwich and Rugby, and not the largeness or smallness of supply on offer in the market. Naturally, if demand proves to be unusually keen, the wholesale buyer will find himself up against prices higher than his retailing customers will pay. He buys up on the spot only enough to fill immediate requirements and then seeks out another market. He will stop buying as soon as he has got a truckload, or two, or whatever quantity gives him the most economic transport costs. On occasion, in order to hold the goodwill of a customer, the wholesaler will intentionally incur a loss on his purchases. If prices are unusually low, the wholesaler may buy in excess of his immediate requirements, and turn the cattle on to accommodation grazing land for a week or two. It is within these extreme fluctuations in price, which are not frequent, that the urban retail butchers' and caterers' fluctuations in demand fix the prices in such large markets as Norwich and Rugby.

An examination of the cattle imports from Ireland and of imports of chilled and frozen beef, concurrent with this inquiry, gives no indication, at least over such short periods, that fluctuations in the amount of imports or in their wholesale price, affected beef prices in Norwich and Rugby, so far as week-to-week variations are concerned. The general course of world prices is reflected, naturally, in the general course of prices at Norwich and Rugby, but variations in quantity and price of imports from day to day showed no apparent relation with market-to-market variations in quantity and price at Norwich and Rugby. Possibly the English and the import trades run separate courses in detail, and are devoted each to its own consuming class, showing the same price reactions only under major influences. For example, if English beef prices rose at the same time that Argentine prices fell, and if these move-

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ments were continued, the housewife would take to buying Argentine beef.

To sum up, the consumers' preference, as reflected in price, is clearly for the lightest-weight beef. The farmer, as reflected in the numbers of cattle put forward per weight-group, appears to approach that demand to the point that is economically best justified by the conditions which control his management.

THE ERADICATION OF WEEDS OF ARABLE LAND BY SODIUM CHLORATE

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THE usefulness of sodium chlorate and other chlorates in the control of certain weeds has been reported from various research stations, more especially from America. In general, the following points have emerged from the trials carried out at these centres:—

- (1) An autumn application of 100 lb. per acre of sodium chlorate, either broadcast in pulverized form, or applied as a spray (100 lb. per 100 gal. water), will give a complete control of weeds such as ragwort, chickweed, buttercups, etc.
- (2) 3 or 4 sprayings throughout the season are more effective than one application.
- (3) The treatment becomes more effective as the plants reach maturity.
- (4) The process of nitrification is retarded.
- (5) Some authorities state that only light applications should be made in orchards; others have found that two or three sprayings of 100 lb. per acre can be safely used to kill bindweed growing round trees and shrubs.
- (6) A reduced yield of corn may be expected in the year immediately following the treatment.
- (7) No ill effects are noted a year after the last application, and the surface soil becomes free from the substance in from three to eight months.
- (8) The chemical, when mixed with starch, straw, cotton and plant residues, produces an explosive mixture if struck, or burns very rapidly if ignited.
- (9) The chemical has a poisonous effect on live stock if taken internally.
- (10) The material cannot be applied to a growing crop of corn in order to kill the weeds growing in it. If this is done in all probability the corn will be killed.
- (11) Bent grasses (*Agrostis* spp.) are partially killed but invariably recover. A dry application of 60-80 lb. per acre will severely injure dandelion and grass (temporarily). Buttercups and chickweed appear to recover.

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In order to test the effect of this chemical on weeds in the West of England, experiments were commenced, in collaboration with the Agricultural Organizer for the County, on a farm in Herefordshire, late in October, 1931. An area of land about 8 acres in extent was selected for the purpose. It had previously been used for the extensive production of roses, and had been so neglected as to contain about 40 different species of weeds with a preponderance of docks. Some of the land had lain derelict for two years. The experimental area, situated on a steep hillside, had a heavy loam soil derived from the old red sandstone formation. The sodium chlorate was applied during the last week of October, at the rate of 2 cwt. per acre; over part of the area it was broadcast and over the remainder it was sprayed in solution. A strip was left as a control, and a further area was subjected to the usual cultural cleaning operations without the use of the chemical. Just before the application, a botanical count of the flora was made, using the method of Armstrong, and the following average result was obtained:—

	Percentage of ground covered.	Square yards per acre covered by weeds, etc.
Docks (<i>Rumex</i> spp.)	18	871.2
Buttercups (<i>Ranunculus</i> spp.)	12	580.8
Creeping Thistle (<i>Carduus arvensis</i>)	10	484.0
Broad-leaved Plantain (<i>Plantago major</i>)	6	290.4
Couch Grass (<i>Triticum repens</i>)	5	242.0
Common Bent (<i>Agrostis vulgaris</i>)	5	242.0
Field Bindweed (<i>Convolvulus arvensis</i>)	5	242.0
Annual Meadow Grass (<i>Poa annua</i>)	4	193.6
Speedwells (<i>Veronica</i> spp.)	3	145.2
Knotgrass (<i>Polygonum aviculare</i>)	3	145.2
Fat Hen (<i>Chenopodium album</i>)	2	96.8
Groundsel (<i>Senecio vulgaris</i>)	2	96.8
Black Bindweed (<i>Polygonum convolvulus</i>)	2	96.8
Mouse-ear Chickweed (<i>Cerastium vulgatum</i>)	2	96.8
Redshank (<i>Polygonum persicaria</i>)	1	48.4
Cut-leaved Geranium (<i>Geranium dissectum</i>)	1	48.4
Wild White Clover (<i>Trifolium repens</i>)	1	48.4
Dandelion (<i>Taraxacum officinale</i>)	1	48.4
Charlock (<i>Sinapis arvensis</i>)	1	48.4
Willow Herb, Shepherd's Purse, Fool's Parsley, Hawkbit, Field Mint, Cudweed, Knapweed, Pimpernel, Florin, Sow Thistle, Dead Nettle, Self-Heal, Wild Pea, Coltsfoot, Sorrel, Bedstraw, etc.	7	338.8
Total area covered by weeds	91	4,404.4
Bare spaces	9	435.6

The treated area was examined in April, 1932 (i.e., some

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six months after treatment), and it was found that the chemical had been to some extent effective. Possibly the treatment would have been more effective but for the abnormally heavy rains in November (immediately following the application), causing considerable leaching. It seemed that rather better results had been obtained where the sodium chlorate had been broadcast. The chemical had killed the buttercups ("crazy"), but although the couch and bent grass appeared to be dead, close examination showed that each apparently dead piece had one or more nodes alive, and sprouting was just about to commence. Many weed seeds, including docks, bedstraw and fat hen were just beginning to germinate. Docks, bindweed and all the strong deep-rooting species were unaffected by the treatment. Although no dandelions were visible above ground, the roots appeared to be alive. The untreated strip in the field was full of weeds, particularly buttercups, couch and bent grass, and bindweed.

The area was again examined early in June, 1932 (i.e., 8 months after treatment), when it was being prepared for planting. Before applying the sodium chlorate, the land was ploughed in October, followed by one slight disc-harrowing to level the soil with the object of preventing the material being washed out by rain. No further cultivation was done until June. The nodes of the bent grass which were noted to be alive on the occasion of the examination in April had produced thin, weakly shoots. There had undoubtedly been a good control of the weeds, and this would have been still better had climatic conditions in May been more suitable for weed control. The buttercups appeared to have been exterminated and the creeping thistles reduced to a minimum, but the field bindweed and docks were unaffected. The outside control area was full of charlock, fat hen, annual meadow grass, redshank, pimpernel and bent grass.

The comparative botanical counts recorded in June, 1932, are shown in the Table on p. 227.

A final visit was made in October, 1932, when it was seen that the treatment had eradicated the couch and creeping bent grasses, and the shallow-rooted annual weeds. It had reduced the creeping thistle, so that only a few scattered plants could be found. On the other hand, the bindweed and docks were growing strongly and obviously had completely recovered from any slight check they may

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<i>Treated Area (Broadcast).</i>				<i>Untreated Area.</i>	
	<i>Percentage of ground covered.</i>	<i>Sq. Yd. per acre covered.</i>		<i>Percentage of ground covered.</i>	<i>Sq. Yd. per acre covered.</i>
Docks	5	242.0		5	242.0
Groundsel	—	—		4	193.6
Couch Grass	2	96.8		5	242.0
Common Bent Grass	2	96.8		6	290.4
Annual Meadow Grass	—	—		10	484.0
Charlock	—	—		6	290.4
Redshank	—	—		3	145.2
Creeping Thistle	—	—		2	96.8
Fat Hen	—	—		2	96.8
Dandelion*	—	—		1	48.4
Field Bindweed	3	145.2		4	193.6
Buttercup	—	—		4	193.6
Broad-leaved Plantain	—	—		2	96.8
Other Weeds	5	242.0		3	145.2
<hr/>					
Total Area covered					
by Weeds	17	822.8		57	2,758.8
Bare Spaces	83	4,017.2		43	2,081.2

have received at the time of the application of the chemical. The dandelions that had remained defoliated during the spring and summer had thrown up fresh green shoots and leaves, and several plants of coltsfoot, not previously noticed, had appeared. It is interesting to note that, although certain of the nodes of the creeping grasses seemed to have withstood the treatment and had actually given rise to growing shoots, they had succumbed by the end of the season. Presumably the underground creeping stem had contained a sufficient reserve of plant food to permit of sprouting, but the plant as a whole had been so weakened that the subsequent surface cultivation of the soil had killed the weak shoots. During the first six or seven months after treatment, it appeared that broadcasting the material had produced better results than spraying, but by the end of the season there was little to choose between the two areas. It must be remembered that the season 1931-32 was a good one for the eradication of weeds. The month of June was particularly good, although May was quite hopeless, but on the whole, the usual cultural operations on fallow or root land during the season would, in any event, have brought about a diminution in the weed population. It will be realized that even with the sodium chlorate treatment, cleaning operations are also necessary.

* No dandelion leaves visible above ground, although roots dug up were shooting and apparently healthy.

THE ERADICATION OF WEEDS

The cost of the material was £2 10s. per acre and the cost of applying it, at the rate of 2 cwt. per acre, amounted to 15s., giving a total cost of £3 5s. per acre. In addition to this, the usual charges for such cleaning operations as scuffling, harrowing, ploughing, etc., must be taken into consideration. In this connexion, it may be mentioned that the control area outside the plots had a sum of £4 per acre spent on it for cleaning operations and was, at the end of the season, far less clean than the sodium-chlorate treated area. As far as could be judged, the chemical had no adverse effect on the yield and appearance of the potato crop grown on the area during the season the treatment was under trial.

Summarizing the results obtained, it would appear that sodium chlorate, applied in the autumn, at the rate of 2 cwt. per acre, to very weedy land of the heavy loam type, and used in conjunction with the usual cultural operations for the control of weeds, will bring about the eradication of couch grass, creeping bent grass, crowfoot, and shallow-rooted annual weeds. Creeping thistles are reduced by the treatment, but field and black bindweed, docks, dock seeds and other fleshy, deep-rooted plants are unaffected. Although the original leaves of dandelions are destroyed by the material, the roots retain their vitality and will produce fresh shoots later in the season. Bearing in mind the cost of the material, its dangerous nature and its limitations in the control of weeds, the use of sodium chlorate in general agriculture can only be recommended in special cases.

In this connexion, reference may be made to a previous note on this subject,* in which the results of preliminary experiments conducted at Jealotts Hill on the use of sodium chlorate as a weed exterminator are reported, the conclusions arrived at being in general agreement with those given above.

* This JOURNAL, Vol. XXXVIII, No. 6, September, 1931, p. 665.

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National Mark Eggs.—The total output of the National Mark Egg Packing Stations for the three months, January to March, 1933, was 125.6 million eggs, of which 101.6 million were packed under the National Mark, as compared with 103.1 million and 83.8 million, respectively, for the corresponding period of 1932. The following Table shows the aggregate monthly output of the stations during these periods.

Month	1932			1933		
	Total output of Packing Stations (fresh eggs)	Output under National Mark	Per-centage of total out-put under National Mark	Total output of Packing Stations (fresh eggs)	Output under National Mark	Per-centage of total out-put under National Mark
Jan.	Millions 27.2	Millions 21.9	Per cent. 80	Millions 35.1	Millions 29.1	Per cent. 84
Feb.	30.7	25.6	84	35.0	28.9	82
March	45.2	36.3	80	55.5	43.6	78
Totals for 3 months	103.1	83.8	81	125.6	101.6	81

Since January 1, 1932, each authorized packer has been required to pack under the National Mark not less than 50 per cent. of the station's total output. The actual average percentage of output of all stations so packed during 1931 and 1932 was 75 and 81, respectively. It has now been decided, with the concurrence of the National Mark Egg and Poultry Trade Committee, that the minimum percentage of each station's total yearly output of fresh eggs to be packed under the Mark shall, as from November 1 next, be 66 $\frac{2}{3}$ per cent.

It has also been decided that, except in the case of producer-controlled packing stations, new applicants for authorization in the scheme will be required to have a minimum weekly output of fresh eggs equivalent to—

60 cases of 30-dozen eggs from January to July;
 40 " " " " " during August and September;
 20 " " " " " from October to December.

In order that producers may be encouraged to set up packing stations on a relatively small turnover, the minimum requirements in respect of producer-controlled packing stations will remain at half the above quantities.

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National Mark Dressed Poultry.—The total output of the authorized stations for the three months January to March, which are “ free months ” as far as output under the National Mark is concerned, was 91,000 birds, of which 28,000 were packed under National Mark labels.

Various wholesalers of table poultry have reported that, since the introduction of the National Mark Scheme, supplies have been coming on to the market earlier in the year and that the general quality of poultry supplies is showing marked improvement.

An interesting display of market packs of pullets was arranged on April 20 by Messrs. Game and Son of Smithfield Market, London, in co-operation with the Gloucestershire Agricultural Education Committee. A novel method of judging was adopted, nine salesmen, two stores' buyers, four retailers, and two County Poultry Instructors being asked to place the entries. The final placing was based upon the grouped results, and prizes were awarded as follows:—

1st.—Messrs. Alexander and Angell, Cranham.

(National Mark Poultry Packing Station No. 6.)

2nd.—Mrs. V. H. A. Pinchin, Chedworth.

3rd.—Monmouthshire Agricultural College.

National Mark Vegetables.—The National Mark Scheme for asparagus was introduced in May, and applications for enrolment have already been received. Authority to apply the Mark may be granted to:—

- (i) Growers with an estimated annual output of not less than 1,500 bundles or whose total area of land devoted to asparagus production in a year is not less than 1 acre;
- (ii) Approved associations of growers (including agricultural co-operative societies) whose members have an aggregate area under asparagus of 2 acres. There is no minimum output qualification in the case of individual growers who are members of an approved association;
- (iii) Merchant packers, possessing their own packing premises and having an annual output of not less than 7,500 bundles.

The details of National Mark schemes for bunched carrots and fresh green peas have been agreed with growers, merchants and distributors, and the schemes will be introduced this year.

Supplies of National Mark cauliflower and broccoli have met a ready demand on the principal markets, and reports from individual growers indicate that the prices received have more than compensated for the expense and trouble of grading.

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National Mark Malt Products.—The Ministry has decided to adopt, for the purposes of the National Mark Malt Products Scheme, a revised grade designation and definition of quality for Pharmaceutical Malt Extract, which will enable malt extract as defined in the 1932 edition of the British Pharmacopœia Codex to qualify for the application of the National Mark. A notice has been published in the *London Gazette*, indicating the Minister's intention to make new regulations under the Agricultural Produce (Grading and Marking) Acts, 1928 and 1931, in substitution for the regulations made in 1932.

National Mark Scheme for Cheshire Cheese.—A draft scheme for the proposed application of the National Mark to Cheshire cheese was discussed on May 8 at a conference with representatives of the National Farmers' Union, the Cheshire Cheese Federation, the Cheshire and Lancashire Cheese Factors' Association, the Federation of Grocers' Associations of the United Kingdom, and the National Association of Creamery Proprietors. Draft standard grade designations and definitions of quality were unanimously recommended by the conference, and substantial agreement was reached on a number of other important points in connexion with the administration of the scheme.

It is hoped, as a result of the conference, to introduce in 1933 a National Mark Scheme for Cheshire cheese, which will prove acceptable to all the interests concerned.

National Mark Scheme for Jam.—The jam industry provides an important outlet for home-grown fruit, and it is in the interests of the fruit growers of this country that the market for jam should be fostered and developed. Large quantities of fruit of varieties that are produced in this country are, however, imported for manufacture into jam, and it is not usually possible for the purchaser to distinguish between such jam and the produce of home-grown fruit. It is estimated, in fact, that some 40 per cent. of the jam made in this country—other than that made from varieties of fruit which cannot be grown here commercially—is produced from imported fruit or pulp.

There is an undoubted demand for jam of a defined standard made from home-grown fruit, and it is believed that, by ensuring that this jam may be readily identified, the demand can be considerably increased to the advantage

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of all concerned. Requests for the introduction of a National Mark Scheme for jam have accordingly been received from fruit growers, jam manufacturers, distributors and consumers.

While from the standpoint of both grower and consumer it is important to establish the origin of the fruit used, it is no less desirable from the point of view of both the manufacturer and the consumer that national standards of quality for jam should be defined and observed. It is true that standards have already been adopted by the Food Manufacturers' Federation in consultation with the Society of Public Analysts, but a National Mark Scheme goes further in that it ensures, under Government control, a guarantee both of the origin of the product and of the observance of standards officially defined. A National Mark Scheme for jam would therefore be a step forward in securing a consistent standard of quality to the consumer, in protecting the trade from unfair competition from within, and in promoting the interests of fruit growers in this country by ensuring that jam made from home produce shall be associated in the public mind with a high degree of excellence.

The Ministry is introducing this year a National Mark Scheme under which one grade only—namely, "Select (Fresh Fruit) Preserve"—will be recognized, and jam eligible for this grade must be made from fresh fruit and sugar only. This is intended as a first step, and the possibility of extending the scheme to include other types of jam made from home-grown fruit will be considered later in the light of experience.

Further particulars of the scheme may be obtained from the Ministry on application. Copies of the draft regulations are on sale at His Majesty's Stationery Office, price *1d.* net.

Marketing Demonstrations.—Marketing demonstrations to illustrate the various National Mark Schemes will be given by the Ministry during June at the following Shows:—Royal Counties, Bournemouth (May 31-June 3); Suffolk, Bury St. Edmunds (June 1-2); Three Counties, Worcester (June 6-8); Northants, Kettering (June 7-8); Staffs, Stoke-on-Trent (June 14-15); Herts, Hatfield (June 15); Norfolk, King's Lynn (June 21-22).

Cattle.—In the March issue of this JOURNAL reference

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was made to a practical demonstration at Barnstaple of the procedure adopted in connexion with the direct consignment of cattle from farm to abattoir for sale by dead-weight and National Mark grades. On April 26, a further demonstration was carried out at Hereford, in co-operation with the National Farmers' Union and the Herefordshire Agricultural Education Committee. For the purpose of this demonstration, 8 Hereford bullocks were provided by two local feeders, one of whom had already sent a considerable number of cattle for sale by grade and dead-weight.

The cattle were dealt with in a similar manner to those at Barnstaple, but on this occasion, the carcasses were dispatched to Birmingham City Meat Market. The local feeders received payment from the Birmingham wholesaler who had made forward quotations, per lb. dead-weight, according to the National Mark grades reached by the carcasses, less the usual cost of sending the live animals to Birmingham by rail and 1s. per head for insurance. Before the cattle were slaughtered, three producers, who had been appointed by a local management committee, were asked to grade them on the hoof, to estimate the number of pounds (dead-weight) per live cwt. at which they were likely to kill out, and to appraise their value with reference to the prices realized that day in the local market. The grading of the carcasses was carried out by one of the Ministry's graders and their dead-weights were noted. Details of the judging, the actual dead-weights, the National Mark grades, and the gross prices realized are given in the Table overleaf (page 234).

The demonstration was attended by about 200 local producers, and keen interest was shown in the methods of weighing and grading the carcasses.

Lambs.—The success that has attended the experimental consignment of gradable cattle from farm to abattoir has induced the National Farmers' Union to ask the Ministry to provide similar facilities for the sale of fat lambs at existing grading centres during the present season. The request for such facilities first arose among producers in Wales, who have established a reputation for high-quality lambs in the Manchester and Midland markets.

Suggested grades for lambs were demonstrated by the Ministry at certain agricultural shows last year. With the object of trying out these grades in conjunction with the

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DETAILS OF DEMONSTRATION OF SALE BY DEAD WEIGHT AND NATIONAL MARK GRADES,
BIRMINGHAM CITY MEAT MARKET. (See page 233)

No. of Animal	Live Weight		National Mark Grade		Dead weight per live cwt.		Actual dead weight	Quoted price per cwt†	Estimated Value*	Amount realized		
	cwt.	qr.	lb.	lb.	Estimated*	Actual						
1	9	1	0		P	S	lb. 610	s. 47	d. 1	£ 21	s. 12	d. 1
2	11	2	0		P	S	62	44	8	19	0	0
3	10	1	14		G	P	61	45	4	23	0	0
4	11	0	14		G	G	68	38	3	20	0	0
5	11	0	0		P	S	65½	43	8	20	10	0
6	10	2	14		P	S	65	42	0	22	0	0
7	10	2	0		S	S	64	44	0	22	0	0
8	11	2	14		S	P	66	41	10½	22	10	0
							67	41	10½	25	0	0
							lb.	s.	d.	£	s.	d.
							610	47	1	19	0	0
							766	44	8	23	0	0
							692	45	4	20	0	0
							731	38	3	20	10	0
							672	43	8	22	0	0
							694	42	0	22	0	0
							707	44	0	22	10	0
							720	41	10½	25	0	0
										£	s.	d.
										21	12	1
										25	10	8
										23	1	4
										22	16	10
										24	0	0
										22	8	0
										23	2	8
										24	1	3

*Estimates made by the local judges.

†These quotations compare with 42s. 6d. per cwt. (1st quality) and 37s. per cwt. (2nd quality) which were the average prices realized in Hereford Market on April 26.

NOTE: S = Select; P = Prime; G = Good.

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proposals put before the Ministry by farmers, experimental consignments of fat lambs, on a grade and dead-weight basis, were recently dealt with at Smithfield Market, London, and at Birmingham and Liverpool.

Displays of National Mark and other Home Produce.

—The temporary demonstration "Empire Shop" arranged by the Empire Marketing Board at Western Road, Brighton, was opened on May 15 by Mr. Malcolm MacDonald, M.P., Under-Secretary of State for Dominion Affairs and Vice-Chairman of the Board, in the presence of a representative gathering of townspeople and traders of Brighton. The first fortnight's display was devoted to the produce of England and Wales, and Lt.-Col. A. J. Muirhead, M.C., M.P., Parliamentary Private Secretary to the Minister of Agriculture and Fisheries, accepted the tenancy of this shop on behalf of the home country.

Publicity for National Mark Products.—The publicity that has been carried out by the Ministry on behalf of the National Mark in the last three years has been instrumental not only in bringing the Mark effectively to the notice of a wide public, but in stimulating a keener appreciation of its significance in relation to other developments of marketing policy. Standardization is a preliminary to organization. The organization of marketing can be undertaken with greater prospects of success in association with a standardized product. Funds have been placed at the Ministry's disposal for continuing publicity for National Mark products during the current financial year ending March 31, 1934, and the following paragraphs indicate in broad outline the various items of publicity that it is proposed to undertake.

(1) *National Mark Shopping Weeks.*—One of the most successful items of publicity that has been carried out in the past has been the holding of National Mark Shopping Weeks in certain provincial cities and towns, often in association with demonstrations and displays at shows and exhibitions. These Shopping Weeks are organized with the co-operation of local committees consisting of representatives of the civic authorities, traders' organizations, and other interests in the city or town concerned. The principal features of such Weeks are shop-window display competitions open to retailers who stock National Mark products, advertisements in local newspapers, and essay-writing competitions for senior school children. Arrangements are also made, wherever possible, for the Ministry's National Mark films to be shown at local cinemas.

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It is proposed to arrange about 10 National Mark Shopping Weeks during the year, including three during the summer months as follows:—

<i>Town.</i>	<i>Date.</i>	<i>Concurrent Event.</i>
Bournemouth, Poole and Christchurch.	May 29- June 3.	Royal Counties Agricultural Show, May 31-June 3.
Stoke-on-Trent.	June 12-17.	Staffordshire Agricultural Show, June 14-15.
Ashton-under-Lyne.	Sept. 20-30.	Ashton - under - Lyne Ideal Home and Industries' Exhibition, Sept. 20-30.

(2) *Empire Marketing Board's Advertising Frames.*—The Ministry has leased the Empire Marketing Board's advertising frames throughout England and Wales for a period of one month from June 6 for the display of a poster-set advertising National Mark products.

(3) *Display Material and Leaflets.*—The provision of display cards, strips and posters, and of propaganda leaflets, for the use of retailers of National Mark products, will be continued.

(4) *Press Advertising.*—The limited funds available preclude any extensive use of the press for advertising purposes, but this medium will be employed to some extent in suitable circumstances.

(5) *Films.*—It is proposed to show the Ministry's marketing films at agricultural shows at which demonstrations are to be given, and at cinema theatres and elsewhere as opportunity offers. It is also proposed to prepare a certain number of new films.

(6) *London Underground Trains.*—London is the most important market for the distribution of National Mark products. It is hoped to arrange a certain amount of publicity in the metropolis, possibly by means of advertisements in underground trains.

(7) *Lectures.*—A considerable number of lectures on the National Mark have been given in the past to women's institutes and other women's organizations, to rotary clubs and to traders' associations. These have assisted in the diffusion of knowledge with regard to the objects and scope of the National Mark movement, and it is proposed to continue, and if possible to extend, activities under this head.

(8) *Press Articles, etc.*—Considerable publicity for National Mark products is secured through the provision of notices and articles to the general, agricultural and trade Press. The principal medium used is the Ministry's Press Service, by means of which a printed sheet containing paragraphs dealing with agricultural matters is circulated every two or three weeks to several hundred newspapers and journals throughout the country.

(9) *Young Grocers' Tours.*—In each of the last three years, with the co-operation of the Institute of Certificated Grocers, a party of the successful students in the Institute's examination has been taken by the Ministry on a short tour of selected agricultural centres, including various National Mark factories and packing stations. A similar six-days' tour has been arranged for July of this year, under the joint auspices of the Ministry and the Institute of Certificated Grocers. The latter will again defray half the cost of the tour.

Wheat Act, 1932.—Wheat certificates lodged with the Wheat Commission up to and including May 12, 1933, covered 17,804,000 cwt. of millable wheat of the 1932 crop, the average selling price per cwt. (on farm) being 5s. 3½d. The total sales up to July 31 next have been estimated for the purposes of the Wheat Act at 19,800,000 cwt.

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On May 27, the Commission made a third payment in advance to registered wheat growers throughout the United Kingdom, on account of deficiency payments that will become due to them under the Wheat Act. The payment, which was at the same rate as those made in December and March last—namely, 3s. per cwt., equal to 13s. 6d. per quarter of 504 lb.—was in respect of certificates lodged with the Commission during the period March 1, 1933, to April 30, 1933. The growers concerned have thus been placed on the same terms as those who received a payment on account in December and in March.

The Commission's total disbursements to growers by way of advances on account of deficiency payments now exceed £2,500,000.

Milk Marketing Scheme (England and Wales).—The Public Inquiry into objections to the Milk Marketing Scheme will open at Court A, Judges' Quadrangle, Royal Courts of Justice, on June 6. The Inquiry will be conducted by Mr. F. M. Russell Davies, K.C., the Commissioner appointed for the purpose by the Minister.

Regulation of Meat Imports.—The arrangements now in operation for the regulation of imports of beef, mutton and lamb, and of bacon are as follows:—

Beef, Mutton and Lamb.*—In accordance with the Ottawa Agreements, the quantities of frozen mutton and lamb and frozen beef imported from South America during the current quarter (April to June) will be 15 per cent. less than those received in the corresponding quarter of last year, compared with a reduction of 10 per cent. in the first quarter of this year. As regards chilled beef from South America, as the result of negotiations it has been arranged that the quantity to be imported during the current quarter will be 5 per cent. above that arranged for the previous quarter, but, even so, it will still be less than that contemplated by the Ottawa Agreements. In regard to frozen mutton and lamb from Australia and New Zealand, the position is as agreed at Ottawa, namely, that supplies of frozen mutton and lamb from these sources *in the year 1933* will not exceed the quantities shipped in the twelve months ended June 30, 1932.

Bacon.—As a result of negotiations with the chief foreign

* For details of previous arrangements see the issues of this JOURNAL for January, 1933, pp. 899-904, and February, 1933, p. 990.

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bacon-exporting countries, agreement has been obtained to a further reduction of imports during each of the three months from March 23* to June 22 by $1\frac{1}{4}$ per cent., $2\frac{1}{2}$ per cent., and $2\frac{1}{2}$ per cent. respectively of the agreed maximum imports in the month ended March 22. The following are the quantities to which the countries concerned have agreed, as far as practicable, to limit shipments:—

	<i>March 23 to April 22. cwt.</i>	<i>April 23 to May 22. cwt.</i>	<i>May 23 to June 22. cwt.</i>
Denmark	487,300	474,700	462,100
Sweden	36,700	35,700	34,700
Netherlands	80,500	78,400	76,400
Poland	77,500	75,500	73,500
Lithuania	38,000	37,000	36,000
Estonia	7,800	7,700	6,500
Finland	4,200	4,100	4,000
Latvia	4,000	3,700	3,600
U.S.S.R.	4,000	4,000	4,000
Argentina	5,800	5,600	5,500
U.S.A.	50,500	49,500	48,500

Pigs and Bacon Marketing Schemes.—After consideration of reports by Mr. S. L. Porter, K.C., who held Public Inquiries into objections lodged against the schemes, the Minister and the Secretary of State for Scotland have prepared a number of modifications, mainly on drafting points, which they propose to make to the schemes. If the promoters assent to the modifications, drafts of the two schemes will be laid before both Houses of Parliament for approval. If Parliament approves and the schemes come into force early in June, they will enter the statutory “suspensory period,” during which a poll of producers has to be taken to decide whether the schemes shall remain in force.

Only those producers (other than exempted producers) who register with the Pigs Marketing Board or the Bacon Marketing Board before the prescribed dates (which will be notified in due course by advertisements in the Press and as far as possible by letters sent to pig producers and bacon curers) will be able to vote on the question whether the scheme which affects them is to remain in force. Pig producers are advised to communicate at once with the local Branch of the National Farmers’ Union, who have prepared a leaflet for the guidance of voters at the poll. Bacon curers should communicate with the Secretary, Food Manufacturers’ Federation (Incorporated), 22, Buckingham Gate London, S.W.1.

* See this JOURNAL, April, 1933, p. 73.

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If the polls are favourable to the continuance of the schemes, the full provisions thereof (including the marketing provisions) will come into force one month after the results are declared. The votes will be counted by independent scrutineers.

COUNCIL OF AGRICULTURE FOR ENGLAND

THE Fortieth Meeting of the Council was held at the Middlesex Guildhall, Westminster, on Thursday, May 18, 1933. *Mr. George Dallas* was elected as Chairman to succeed *Sir Arthur Hazlerigg, Bart.* (Leicester). A very hearty vote of thanks to Sir Arthur for all the work he had done as Chairman during the past twelve months was carried.

In passing the Minutes of the last Meeting, *Sir Douglas Newton, K.B.E., M.P.* (Cambs) drew attention to the fact that the Council's resolution on the subject of the importation of potatoes mentioned the figure of 30s. a ton as a desirable duty for main-crop potatoes. The increased duty had been made £2 for a part of the year.

Standing Committee.—*Mr. James Donaldson* (Oxford) moved the re-election of the Standing Committee *en bloc*. This motion was duly seconded. *Mr. Denton Woodhead* called attention to the fact that Mr. Dallas, having been elected Chairman of the Council, became an *ex-officio* member of the Standing Committee, so that there was technically a vacancy. He moved that the opportunity should be taken of asking Mr. Walter Smith to resume his membership, which he had vacated upon taking office under the late Government. This was duly seconded and agreed by the Council. The Committee was then re-elected *en bloc* with the addition of Mr. Smith.

Milk Reorganization Commission's Report.—*Professor A. W. Ashby*, on behalf of the Standing Committee, moved the adoption of the Standing Committee's Report upon the Reorganization Commission's Report. (Appendix I, page 255.) He stated that the Standing Committee's Report set out the main principles and the recommendations of the Commission so far as producers were concerned with a scheme, and, at the end, dealt briefly with the National Farmers' Union draft scheme. That scheme was the practical proposition at the moment. It departed from the scheme suggested by the Commission in three particulars. First, it gave the Milk Board the power of

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fixing what is called standard production. He hoped it would never be necessary to use this formal power of even indirectly controlling production. His opinion was that there was quite sufficient control of production under the pool price system, and that system properly worked would bring it more quickly and effectively into operation than any formal control could possibly do. Next, the N.F.U. scheme provided for dealing with charges for carriage of milk. He thought, on the whole, that this was an improvement. The third difference was that in the N.F.U. scheme various and important clauses used the term "The Board shall do" this and that. In the Commission's scheme the word "may" was used. This might have the effect, if the wording were maintained, of postponing the initial working of the scheme. The provisional Board would have an enormous task in setting up the necessary organization and, legally, they could only undertake it between the date of declaration of the poll and the date upon which the new contracts were required to come into force. It was a serious practical difficulty, and the provisional Board should start its operations on a provisional basis well before the scheme has been adopted. Milk producers should quite clearly recognize that if this scheme did not come into force, no self-respecting body of men, either producers or distributors, could again go through the farce of a collective agreement. In the last two years such agreements had been quite ineffective. Professor Ashby then dealt with the position in regard to the purchase of Scottish milk in England, and, at the end, said that the Scottish Milk Board and the English Milk Board would, when set up, no doubt arrange for a certain amount of Scottish trade across the Border on condition that Scottish milk should not undersell English milk. The Ministries concerned would, in any case, assist towards a common working arrangement.

Another important point was the recommendation for a Joint Council of producers' and buyers' representatives, with an impartial Chairman and two other members. The Minister had announced that he could not fully accept that proposal, but, since that announcement, an amendment had been proposed to Clause 11 of the Bill which gave most of what was desired in the form of a Joint Negotiating Committee. This Committee would consist of representatives of buyers and of the producers' board, with impartial members, who might be paid. If the two sides did not

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agree as to the impartial members to be appointed, they might appeal to the Minister.

He, personally, should think that the producers would accept that proposal, and the Council of Agriculture might now express the hope that the trade would also accept it. He would ask all milk producers to consider very carefully what would be their position in the market if they did not accept the scheme now before them.

Brig.-Gen. H. Clifton Brown, M.P. (West Sussex) asked whether graded certified milk producers had contracted out of the scheme altogether. He did not see in the English scheme anything to show how the accredited herd recommendation of the Commission and certified milk were going to be treated: also, he asked as to the position of milk under the Sale of Food and Drugs Act, whether the Ministry of Health were taking action to remove the injustice referred to in the last paragraph of the Standing Committee's Report. He agreed that nothing should be done to delay putting the scheme into operation at the earliest possible moment.

In reply to the questions *Professor Ashby* said that the Commission had made several recommendations dealing with the quality of milk, the chief of which, perhaps, was veterinary examination of all herds twice, and possibly thrice, a year. It was to be hoped that such an examination would come into force under practical conditions as soon as possible. As regards graded milks, the Commission recommended that the future Board should negotiate special premiums for the three grades of milk and that these premiums should be paid direct to individual producers. The N.F.U. scheme had preserved the powers to do that. The Commission had recommended that there should be a register of accredited producers so that we might have milk of guaranteed quality not from a few hundred farms but from, say, 50,000 farms in the country. The power to provide that register was also preserved in the N.F.U. scheme. The main business of the provisional Board, however, must be to get the scheme working smoothly and efficiently, and they should not be asked to put too many frills on the scheme before it was so working.

Major R. G. Proby (Hunts) urged that quality was of first importance since the expanding demand depended on the goodwill of the public. The "clean milk" man should therefore be encouraged and the other discouraged.

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Mr. W. W. Sampson (Dorset) pointed out that some County Councils with small and scattered populations not engaged in any large productive industry would find a difficulty in providing money for a universal scheme of inspection of cows. *Mr. R. Bruford* (Somerset) thought it was better to have a national inspection, in which case the expense would be spread evenly. Some counties were more "de-rated" than others. He believed that it would be better to do the whole thing direct from the Ministry of Agriculture.

Mr. Christopher Turnor said that he considered that the Standing Committee had done the Council a good service by this Report. It was an excellent summary of the position. He hoped that the result of the various activities would remove the chance of the industry having to face a situation next October similar to that which they had last year. During the two or three days of it, he had had to pour the bulk of his milk down the drain. As regards manufactured milk, organization was going to succeed only if there were adequate control of imported cheese, whether from the Dominions or from foreign countries. *Mr. W. J. Cumber* (Berks) said he did not believe that the scheme would solve and save the situation. If it were to be adopted and not come into operation as regards accredited producers of graded milk in twelve months, what was to happen during that time to men who had built up, by their own initiative and capital, a market for their high quality milk? Unless they were going to receive a satisfactory price, many of them would revert to the production of milk of a less clean character than they were producing to-day. The present scheme puts a premium on inefficiency. He was told that farmers were going to receive the scheme. They would do so, not because they liked it, but because they were afraid that, if it did not go through, they would be unable to sell their milk in liquid condition. He would make bold to say that every drop of milk could be sold in liquid form fit for the public to drink untreated, if the Milk and Dairies Act, 1915, were put into operation throughout the country, and cowsheds properly passed as fit and clean for milk production. He was also opposed to someone else doing the farmer's business for him. Farmers were not all fools. He could not see the iron or the coal people doing the same thing. He considered business a part of the farmer's training, and a part of his job to sell his produce when he had produced it. It would be a bad day for agri-

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culture when the business-side was done by somebody else while farmers became purely and simply producers. He hoped the Council would not endorse the N.F.U. scheme. He realized that he was "a voice crying in the wilderness."

Mr. Charles Roberts (Cumberland) said he was anxious about the scheme and he hoped that the last speaker was "a voice crying in the wilderness," but he was not quite sure that he was. It would, of course, be a great mistake if producers of graded milk "crabbed" the scheme, which was far more likely to raise the whole status of milk production than to do damage to present special prices. The scheme was a very complicated one and the necessary steps had to be hurried on if the disastrous dog-fight in October were to be avoided. He disagreed entirely with the last speaker on business and farming. Production and salesmanship were two quite separate things. As long as the farmer wished to be a mere individualist, selling in a limited market his own individual produce, there was no chance for him in these days. It was one thing for the scheme to be accepted at the Council meeting to-day and quite another thing to get 66 per cent. of farmers to vote for it. There was a great deal of spade-work to be done before the poll, and he hoped that the Ministry would be able to help.

Mr. H. W. Thomas (Hants) was glad to see that the Standing Committee had spoken in such good terms of the N.F.U. scheme. As a milk producer, he would say unhesitatingly that unless something were done there would be absolute chaos in the milk market. Last summer many smallholders were unable to get 6d. a gallon for their milk, and the Council had to consider the importance of the small producer throughout the country. These had a right to market their milk as well as Mr. Cumber, who, he gathered, always got a ready sale for his. *Mr. T. C. Goodwin* (Cheshire) said that he hoped the scheme presented by the N.F.U. would receive the support of farmers throughout the country. He, personally, thought it would, though there were points upon which it could usefully be amended. The chief thing, however, was to get the main principles approved. Unless there were adequate restriction of imported milk products, there would be grave danger to the scheme, even after it was being operated. One of the objects of the Commission's Report was to raise the general standard of milk production throughout the whole country. He did not agree that the improved veterinary inspection of

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cattle was going to cost a bigger sum if counties did it, than if it were done in other ways. Part-time veterinary surgeons' work in some counties was certainly costly as compared with the work of full-time veterinary officers. Cheshire was about to appoint six whole-time veterinary officers in place of twenty-one part-time men. In his view, it was better to do the work by County Councils than by a Government Department. *Lord De La Warr* (Parliamentary Secretary to the Ministry of Agriculture and Fisheries) expressed himself as gratified with the reception of the scheme by the Council. He would like to assure Mr. Goodwin on one small point—that there was at least one Government Department that at the moment was not looking for any more work. The details of the milk scheme were, as far as the Ministry was concerned, *sub judice*, until the Minister had received the Report of the Public Inquiry. As regards Mr. Cumber's speech, what distressed him was the appalling complacency it seemed to show about the present situation. While it might be admitted that there might be a number of cowsheds not of a very high standard, he could not conceive that the Government would at this stage close down those of hard-pressed farmers and landlords rather than proceed to deal with the question of cleaning up the supplies of milk by the gradual and progressive method which had been pursued in the past. As regards marketing, surely the Agricultural Marketing Acts merely made provision for the farmer to do his own marketing, but in an improved manner. As regards the quota *versus* tariff, he was not going now to open up that subject, though he would say that the Government, after having considered the matter most carefully, had come to the decision to drive forward in a particular manner. He would appeal to the Council that, the Government having reached that decision, it was for the industry to rally behind the Government. We were coming shortly to a very crucial period when important polls of farmers would be taken. The first poll would be that of the pig scheme and the bacon scheme. Later, we would come to the poll of milk producers. No one at the Council needed telling of the situation of the average farmer, out in the countryside, isolated, fighting with his back to the wall. We should realize how important to him was the leadership from men he knew and in whom he had confidence. Going about the country, influential farmers had come to him and said,

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“ Just how can we help; what can we do at this moment? ” The reply was clear and simple, and he would appeal to all to use their influence in giving farmers a wise lead in backing their own Farmers’ Union scheme. *Mr. Walter Smith* said he would like to support one point made by the Parliamentary Secretary. In an Eastern Counties town last week, he had seen milk being sold in the street at 1d. a pint. What the producer was getting for it he could not say, but surely that fact alone showed that the time had arrived for the industry to be put on a better basis.

In winding up the discussion, *Professor Ashby* said he would like to make it absolutely certain that no suggestion went out from the Council that the Board would fix premiums or negotiate premiums for graded milks. He would be sorry if the premiums for all the three recognized grades were not fixed from the time standing contracts under the scheme began. His reference to postponement was to postponement of the accredited producers’ scheme—a totally different matter. The bringing into force of the accredited producers’ roll was a purely practical process, and he would point out that at the moment the producers of about seven counties could get veterinary inspection for nothing, whereas those in all other counties who wished to become accredited producers would have to pay the veterinary fee for inspection. The sooner a universal system of clinical inspection could be started in these other counties the sooner it would be possible to bring into force the provisions of the accredited producers’ roll with perfect fairness to all producers. If all milk producers were able to obtain the good prices got by a few very favourably placed producers in the Thames Valley, he, personally, would not advocate a scheme of this kind. The position, as he saw it, was that during last winter there were men getting for milk equally as good as that for which 1s. 4d. was being paid only 8d., 9d. and 10d., and that there were others turning out good quality milk to-day and getting no more than 5½d. This low-priced milk was pressing on the retail liquid-milk market, and there was every need for the scheme. The scheme could not be imposed on farmers, though some farmers would like to see that done, but he was certain that there was more stability and permanence in the democratic method, by understanding it and voting for it, which, however, required more time. *The Chairman*, before putting the motion, said that he was sure the Council

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appreciated the great value of the work Professor Ashby had been doing on behalf of milk producers in connexion, first, as a member of the Commission, and, second, in his speeches on the question up and down the country.

The Report was adopted by the Council.

Standards for Cream.—*Mr. Clement Smith* (East Suffolk), Chairman of the Standing Committee, moved the adoption of the Committee's Report (see Appendix II, page 260). He referred to the Milk Commission's Report, to which also this Report had reference. He was glad to see that there had been some improvement in the consumption of cream in this country since the War: pre-War the value of cream consumed was put at £36,000, and in 1930 at £620,000 per annum. There was still much room for advance, and this country was very much behind other leading countries in cream consumption. The Report urged that improvement would be obtained by grading cream into three qualities which would be recognized by the trade and bought at fair prices by the public. The Report was put to the Meeting and carried.

London Court of Arbitration.—*Mr. Clement Smith*, on behalf of the Standing Committee, recommended the adoption of this Report, which, he pointed out, was in favour of acceding to the invitation of the London Court of Arbitration to the Council to appoint a representative of agriculture to sit on that Court. The person nominated would in due course make a Report to the Council as to the facilities afforded by the Court's organization for settling disputes over business contracts, etc., in agriculture. *Sir Douglas Newton* asked a question in order to elucidate the exact position of the Council in the matter, which was explained to him by the Chairman by reference to the terms of paragraph 5 of the Report. The Report was put to the Meeting and carried.

Malting Barley.—*Mr. A. Symonds* (West Suffolk) moved the following resolution:—

"That owing to the present serious losses to arable agriculture in the Eastern Counties, due to the heavy beer duty, the Council urges the Government to re-establish the position of the malting barley growers, either by some method of rebate for beer brewed from British barley, or by a heavy tax on imported malting barley, or by some other home preferential legislation."

He made a strong plea in favour of the greater use of

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British barley by brewers on the ground that the malting qualities found in barley in the Eastern Counties could not be improved upon. Land in this country should not be allowed to go derelict, and men become unemployed in the villages whilst barley was imported from abroad. In Suffolk, normally, they grew more barley than wheat. It could be made to pay at 50s. a quarter on his land in Suffolk. Given this price to the grower the crop would be grown. In seconding the resolution, *Mr. Sampson* reminded the Council that two years ago his resolution for reduction of the tax on beer had been passed by the Council. The reduction this year came too late to influence the area of barley. In his part of the country, brewers had come forward and bought English barley fairly well. It should be remembered that by encouraging the growth of wheat and barley the milk industry was helped. He hoped the Minister would see his way to deal with malting barley on the same principle as he had dealt with wheat. After a short further discussion, the resolution was put to the Meeting and carried.

Prices of Milk for Cheese.—*The Rt. Hon. Lord Strachie, P.C.* (Somerset) moved the following resolution:—

“That no milk scheme will be satisfactory which does not provide for an adequate price for milk manufactured into cheese.”

His Lordship, in the course of his speech, said that his chief reason for proposing the resolution was that cheese prices at the present time were not at all adequate, and it was clear that the milk scheme to be satisfactory must make the prices adequate. At the last Annual Meeting of the British Dairy Farmers' Association, a resolution was passed to the effect that the Association deplored the position of the cheese industry, which was a direct menace to the success of any national milk scheme, and asked the Minister to take steps to save the home industry from complete collapse. On another occasion recently the Minister had had a deputation from the chief cheese-making areas asking for a limitation of cheese imports. It would be very useful soon to have a pronouncement from the Minister as to what he was doing in the matter. The Dominions send us 87 per cent. of the whole importation of cheese, and for the three years under the Ottawa Agreement the hands of the Government were tied and they were unable to have a quota for cheese coming from the Dominions or to put any tariff on it.

To make a levy upon producers who sell liquid milk to

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compensate cheese farmers who make cheese was rather like making the dog eat his own tail. The price for Dominion cheese was 6*d.*, which was a ruinous price for our own farmers to follow. In some parts of Somerset it was practically impossible to sell liquid milk owing to local conditions, and farmers were thrown back upon the manufacture of cheese and butter. *Mr. Goodwin* seconded the resolution, adding that the Cheshire Cheese-Makers' Federation had been in fairly constant communication with the Minister on this subject during the past four months. The alteration in the rate of exchange with New Zealand and Canada had, since the Ottawa Agreement, given Dominion farmers a bounty round about 15 per cent. On that ground alone the Government should do something to carry out their own declared intention of giving the home producer first place in his own market. As regards the size of the industry, he claimed that the figures in the Commission's Report were inadequate. Milk made into Cheshire cheese alone represented 60 million gallons per annum. The resolution was put to the Council and carried.

Land Valuation and Land Tax.—*The Rt. Hon. Lord Strachie, P.C.*, moved the following resolution:—

“ That the Valuation and Land Tax imposed by the Finance Act, 1931, should be repealed entirely.”

The relative provisions of the Finance Act of 1931 had never been carried to the issue. It would cost an immense amount of money to value every field in the country, and in many cases there would be counter-valuations and so on. The Finance Act, 1932, continued the provisions, though it had been urged in the debates that they should be struck out. The Government had again put them into their Finance Bill, 1933. *Brig.-Gen. H. Clifton Brown* seconded the motion. He thought that the effect of these provisions in relation to the owner or the man who wanted to develop his property as a small-holder was a serious detriment to progress. *Mr. W. R. Smith* said he thought the Council meeting was hardly the place for a motion of this kind. *Sir Douglas Newton* said that the practical point was that the presence on the Statute Book of these provisions made the free sale of land difficult. The resolution was put to the Meeting and carried.

Rate of Interest on Long-Term Loans.—*Mr. F. J. Jenkinson (Kesteven)* moved the following resolution:—

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" That this Council requests the Minister of Agriculture to take steps to reduce the rate of interest charged for the purchase of farms, under the Long Term Credits provided in the Agricultural Credits Acts of 1923 and 1928."

He drew attention to the fact that in and about 1918 there had been a considerable number of sales of land throughout the country, the effect of which had proved disastrous to those tenant farmers concerned in them. There was then the Corn Production Act and the undertaking of the Government that agriculture would not remain as in the past. Money borrowed was at a high rate of interest. A similar Act had been passed in 1928, and the rate of borrowing under it had also been high. In the Act of 1923, 75 per cent. of the value of a farm was allowed to be advanced, so that the Government on that date thought there was a reasonable prospect of the farmer being able to repay that amount. To-day there was plenty of cheap money to be had which could replace this dear money. *Mr. Christopher Turnor* seconded the resolution and said that he thought there was a strong case for a reduction in the rate of interest. *Lord Clinton* said that while the resolution was one which might appeal to many borrowers under this fund, it was a perfectly impracticable one for the Council to pass. It asked the Ministry to reduce the rate of interest: the rate had nothing at all to do with the Ministry or with the Government. The capital advanced had been advanced by the Agricultural Mortgage Corporation by borrowings from the public. Debentures were issued at 5 per cent. Nobody could reduce that rate of interest because there was no means of paying off those debentures. While at the present day money might be raised at a lower rate of interest it was impossible to touch the present rate now being charged. *Sir C. J. Howell Thomas, K.C.B., C.M.G.* (Permanent Secretary to the Ministry), said that Lord Clinton had already referred to certain points. As regards the Act of 1923, the Financial Secretary to the Treasury had explained the precise position in answer to a question in the House on November 17, 1932, the position being that, for reasons which have already been stated, he could not reduce these rates. This position obtained still under the Agricultural Credits Acts. The Ministry was of course very interested in the question of credit, and he would remind them that the Marketing Boards which would be set up under the Marketing Acts would be in a strong position to obtain credit from the banks because they were

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statutory bodies possessing powers of making levies on constituent members. *Mr. F. Sole* (Isle of Ely) expressed his disagreement with the general trend of the last two statements. He thought that these farmers were entitled to more consideration and that the Government had a clear duty to revise the Acts in some way or other. The resolution was put to the Meeting and lost.

Reorganization and Restriction of Imports.—*Sir A. G. Hazlerigg, Bart.* (Leicester) moved the following resolution:—

“ That the Council of Agriculture for England notes and appreciates the steps which are being taken by the Government to place in growers' hands the means to organize their several industries with a view to enabling them to obtain financial returns which will yield profits with consequent stability to the industry. It is confident that the success of these steps depends upon a fuller control of imports of competitive overseas produce than has hitherto been attempted, and it hopes that the Government will see its way to explore item by item the true position as regards imports and home production, and, so far as the possibilities of the situation allow, make whatever changes in the regulation of imports are necessary so that these can operate for any commodity immediately active steps are taken to put into effect any scheme for the better organization of home production and marketing.”

He said that the Council would notice that the resolution refrained from stating that the Council approved of the steps which the Government were taking because he thought many of them would like to see the Government go further. There should be no question of quotas *versus* tariffs. What agriculturists asked for was quotas and tariffs. The country was not in the position of the man who asked for bread and was given a stone. It had asked for bread and butter and was given dry bread. He thought he could say quite frankly that British agriculture was still up against the fact that enormous supplies of foodstuffs were coming in from the Dominions, and these were quite likely to prevent the Government from implementing their pledge to British farmers that they should have the first chance in their own market. He knew that the Minister and those working with him at the Ministry were doing all they possibly could in the present position to help. So far as the Danish and Argentine Agreements went, he thought there had been a very bad Press. That is to say, that they made out the Agreements to mean something quite different from what they had found afterwards was actually the case. He would say quite frankly that he believed the Danish Agreement would help in the future about bacon and that the Argentine

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Agreement might help them quite quickly about chilled beef. He understood that they could have a further cut of 10 per cent. on chilled beef imported from the Argentine over the amount of the Ottawa Agreement, and he begged that the Government would make some of that cut quickly, because everyone would agree that the price of 38s. 6d. per cwt. for best selected light-weight cattle was not a remunerative price. That was the quotation in the Carlisle market last week. He hoped that the motion, when carried, would help the Minister in his great task in trying to make agricultural prices in this country remunerative to the ordinary producer. In seconding the resolution, *Mr. Cecil Robinson* (Holland) stated his conviction that unless we had full control of imports any marketing scheme must fail. He referred also to the excellence of the National Mark Scheme from the point of view of getting better markets and prices.

Minister's Speech.—Major Walter Elliot, Minister of Agriculture, in his reply, said, in relation to the forthcoming meetings of the World Economic Conference, that he was sure the Council would be glad to know that the Government considered agriculture to be one of the most important subjects which the World Economic Conference would discuss, and considered also that a rise in the price levels for the primary producer, and particularly for the agricultural producer, was of fundamental importance to the recovery of world trade and was one of the objects which the Government was going into the Conference to secure.

Sir Arthur Hazlerigg's motion referred to the steps which the Government were taking to enable growers to organize their several industries, and expressed the view that the success of those steps depended upon a fuller control of overseas produce than had hitherto been attempted; it also expressed the hope that the Government would make whatever changes in the regulation of imports were necessary, so that these could operate for any commodity immediately active steps were taken to put into effect any scheme for the better organization of home production and marketing. "Here," Major Elliot said, "is an earnest of our action in that respect. Here is the Agricultural Marketing Bill which has passed its Committee stage in the House of Commons this week, and which I hope will pass through all its stages in the House of Commons before the House

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risers for the Whitsun Recess." At the very beginning of that Bill was, in fact, the declaration which the resolution desired, viz., that the Board of Trade might make an Order regulating the importation into the United Kingdom of any agricultural product if it became necessary to regulate it so that an agricultural marketing scheme could be effective in this country. The marketing schemes that were being put forward pivoted, as Sir Arthur Hazlerigg had said, upon the adequate control of foreign imports, and these marketing schemes, which the Ministry was also backing to the full, would be paralleled by the regulation of foreign imports to whatever point was necessary to make the schemes effective. In fact, the Government had gone further than the resolution asked, because not only could such control be effected to make a marketing scheme work, but such control could be imposed, and it would be imposed, not merely where a scheme was in force but also where a scheme had been prepared and was not in force, and further where a scheme was only in course of preparation. If it was necessary to get the ground in good order to put in a crop, it had got to be ploughed and harrowed first, and, if necessary, he would certainly not wait until a scheme had been prepared or was in force before imposing regulation of imports.

There were actually before the agricultural community the pig scheme, the bacon scheme, the milk scheme, and the potato scheme. He would have wished it had been possible to have taken this vast development at a somewhat slower speed. The only danger he foresaw was that there might not be enough free executive ability in the agricultural community to grapple with and master the tremendous problems of these very great schemes. They were, in fact, no less a task than would be represented by the reorganization of one of the great railway lines, or one of the great staple industries such as iron and steel, and it would be the task of the Government, in the closest co-operation with the agricultural community, to search out and help with executive ability and brains the men who would have the task of launching these tremendous schemes—these provisional Boards who would have to take in hand the reorganization of industries as great as any industry in the land. He asked for the whole-hearted co-operation of members of the Council, the natural leaders of the agricultural community, both in the task of themselves directing

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this work and in the task of co-operating with any outside body of far-sighted and intelligent men who would be helping. He would give as an example, although in another walk of life, the great advantage which the agricultural and trading community had had from Lord Linlithgow, who came in at very short notice to help with the Meat Advisory Committee, and whose work as Chairman, and whose intimate knowledge of the subject, had done a very great deal to produce the harmonious working of the distribution of the regulated supplies.

The schemes of import control were just now working on a voluntary basis, and that was a fact that had to be remembered when he and the Ministry were criticized because the schemes were not working in every aspect exactly as one would have wished. The situation had been held since last autumn without a line upon the Statute Book to authorize him to hold it. At the present time emergency action was being taken for the purpose of dealing with processed milk products. It was hoped to secure, in advance of the Marketing Bill becoming law, considerable restriction in such products as tinned cream, skimmed milk and milk powder, upon which he was negotiating with foreign countries.

The Minister then dealt with the position in regard to the trade agreements. The Government had, as part of its long-distance policy, to regard the trade of Great Britain as a whole. The market for agricultural produce in this country—the greatest and most important of all markets for surplus agricultural produce—depended not merely on the work and activity of the countryside: it depended also on the work and activity of the towns. That was where the trade agreements came in. The country had got to provide for the men who were employed in industry as well as for the men who were employed in agriculture, and the less the towns prospered the less demand was there for the produce of the country. A most vital interest to the British farmer, therefore, was trade, and it was the Government's business to do everything it could to help to stimulate trade so that there might be a healthy, strong, powerful, hard-working town population to consume the things which the countryside was growing for them to eat.

He was very glad to have Sir Arthur Hazlerigg's statement that he believed the community as a whole realized

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that the dangers which had been said to be inherent in the Danish and Argentine Trade Agreements did not in fact exist. He was very glad to have that declaration made in this large representative assembly, and he certainly regarded it as a strong and grateful indication that the work, which was done not merely by the Ministry of Agriculture but by the President of the Board of Trade on behalf of British agriculture in safeguarding our position under those pacts, had been appreciated by the agricultural community. He would convey that to his colleagues in the Cabinet and to the President of the Board of Trade in particular. The agreements, the figures and the clauses had been printed. Still the misunderstanding of them had been profound. He would scarcely have believed that anyone could have read Article 4 of the Danish Agreement saying that for bacon and hams the Danish allocation should not be less than 62 per cent. of the total permitted imports from foreign countries, and continue to argue on the basis that it meant the imports for last year instead of what was plainly said on the face of the agreement. The total permitted imports from foreign countries were the total imports which were permitted!

In the Argentine Agreement it specifically said that first of all imports of Argentine chilled beef might be cut to the 1932 level, which was in fact a cut of 10 per cent. on the previous five-year period from 1927 to 1931, on top of which a further cut of 10 per cent. could be imposed, which would be a total cut of 18½ per cent. below the average of the five-year period from 1927 to 1931, and would be in fact equal to the lowest Argentine imports of chilled beef at any time since 1920. That was an indication that we were prepared to cut a fair proportion of Argentine chilled meat. In addition it was stated in the document that if that was not enough the right was reserved to impose a further cut, only with the proviso that if that were done all the overseas suppliers, Dominions and Argentine, would have to co-operate. That was a fair and reasonable provision and one to which no one could take any exception either in Great Britain or overseas, because all knew that if the market fell to a state at which there was no remuneration in it for the home producer, then the Ottawa declaration of home producer first, Dominion producer second, foreign producer third, came into play, and it was necessary for everyone to hold off the market so that the man at home,

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who after all discovered these islands and made these islands, should have the first chance of supplying their needs.

Further, there were widespread errors about the exact position under the voluntary agreements as they had already been worked, and these had been the subject of criticism in the Press. They had been the subject of question and answer in the House of Commons, and they were the subject of a Debate in the House of Lords. On that he had seen comment in some of the newspapers that morning, and in one in particular a suggestion that there should be an apology from the Minister for the facts which he then gave. He retracted nothing, he qualified nothing, and withdrew nothing. The facts were as given in the House of Commons on April 25 in an official answer to a question by a Member of Parliament, and again by Lord De La Warr in the House of Lords yesterday.

But the task before them was the renaissance of the countryside. Whether they could achieve that in this country—a task that had been of such weight that it had not been achieved in any other country—he could not say, but he was certain they were on the right lines—the organization of producers at home, the regulation of imports from abroad. These were the two cardinal points of the policy.

The Minister ended his speech with a short statement of the present position in regard to meat, dairy produce, cereals, malt and barley, oats, horticultural products and fish.

APPENDIX I

REPORT BY THE STANDING COMMITTEE OF THE COUNCIL OF AGRICULTURE FOR ENGLAND ON THE MILK REORGANIZATION COMMISSION'S REPORT

1. The Standing Committee has had under consideration the Report of the Reorganization Commission for Milk and, while generally approving it and congratulating the Commission very heartily upon it, feels that some summarization of its proposals so far as the dairy farmer will be personally affected, is necessary in order for him to understand how the proposed scheme will work. Even if it may be judged better for the Report to speak for itself on most of these matters, the Standing Committee feels that members of the Council would at least desire to have such a summary for their own information; and, further, that if such a summary were published, it might

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help towards a more general comprehension of the Commission's proposals so far as milk producers are concerned.

2. In the first place, the Commission suggests that a Central Milk Producers' Board should be set up under the Agricultural Marketing Act, 1931, with the main objects (a) of strengthening the position of producers by giving them the means to negotiate with milk distributors as a solid body with one voice and with adequate information; and (b) of ensuring the means by which agreements negotiated with distributors will be universally observed. There are many other advantages which the Commission suggest would flow from the setting up of a Producers' Board. Incidentally it would have the power to require its members to maintain the quality of their milk up to stated standards, to encourage improvement in quality and cleanliness, to conduct their business on regular lines, and to co-ordinate these with those of distributors and manufacturers of by-products, etc. The Board would be a party to all contracts for the sale and purchase of milk, but, subject to this reservation, the relations which have existed between individual producers and buyers in the past will continue. The Board would for price purposes be an intermediary between buyers and sellers, and be a third party in all milk contracts: it would in theory be the buyer and seller of all milk produced for sale in the country, except that of very small producers, or milk sold to employees, or milk sold by producer-retailers. It would not normally be necessary, however, for it to interrupt the ordinary relations between producer and buyer.

3. The Central Producers' Board would have Regional Committees whose business it would be to advise the Board as to regional conditions and prices. There would be eleven of these, one each for the eleven regions suggested and they would provide contact between the Board and individual producers. The Board would be composed of representatives elected by these regions; one of the regions proposed which is much larger than the others would elect two representatives, the others one. In addition to representatives elected in this way, it is proposed that there should be five additional members on the Central Producers' Board elected by registered producers as a whole.

4. Two other central organizations are recommended. A Central Dairymen's and Manufacturers' Board on a statutory basis is proposed which would represent distributors in very much the same way as the Central Producers' Board would represent producers. The second organization, the Joint Milk Control, would consist of the members of the two Central Boards (Producers and Distributors, etc.), with the addition of three independent members, one of whom would be the Chairman of the Council. The chief purpose of the Council would be the fixing of contract terms and prices. It would also promote matters of common concern to all sections of the industry, such as propaganda for increased milk consumption, scientific research into methods of handling and treating milk, the issue of market intelligence for milk and milk products, making any necessary submissions on behalf of the industry to the Import Duties Advisory Committee and similar bodies, and to the Ministry of Health.

5. The proceeds of the sale of all milk would be received by the Central Producers' Board and credited to the regional accounts. A levy would be imposed on all sales of milk for consumption in liquid form, from the proceeds of which compensation would be paid to equalize, to some extent, the prices in regions where the proportions being manufactured differ. Though this levy would be collected all the year round, the proceeds would be disbursed only during the summer months, i.e., in the manufacturing season, and the allocation would be on the basis of the quantities of milk manufactured in the several regions during that season.

6. In addition to fixing the varying regional contract prices for

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milk for liquid consumption, the Joint Milk Council would fix prices for the sale of milk for manufacture and would recommend what normal premiums should be paid for graded milks, i.e., milks graded under the Milk (Special Designations) Order, or any subsequent Order, and which, therefore, ought to carry a premium over the "contract price." The Council would confine itself to *recommending* normal premiums, and producers would negotiate the premiums in their particular cases with their buyers on the basis of the recommended figure—the sums realized being credited to the individual producers concerned. Furthermore, where producers have, by virtue of the excellence of their arrangements for milk production, qualified for registration on the roll of Accredited Producers, they would be entitled to another premium to be called a guaranteed quality premium, and which would be raised by a levy on *all* sales and purchases of milk. Suppliers of graded milk would automatically become Accredited Producers and be in receipt of the guaranteed quality premium. It should be noted that a minimum standard of cleanliness and bacterial content is also proposed with penalties on producers whose milk failed to reach it.

7. For any supplies of milk for which no buyers could be found, either for liquid sale or for manufacturer, the Central Producers' Board would accept responsibility. The Board, then, might manufacture the milk on its own account or arrange for conversion by manufacturers on its behalf on a commission basis. Whatever the method of disposal, the proceeds from the sale of all manufacturing milk would be received by the Central Producers' Board where they would be added to the proceeds from milk disposed of for liquid sale, and subject to the requirements above mentioned, would constitute the fund from which the regional basic price would be calculated. This price would constitute the basic price payable to all producers in the region, whether their milk was consumed liquid or manufactured.

8. Two types of contract are recommended by the Commission as being sufficient to meet the requirements of buyers. First, contracts which will provide for the supply of specified daily quantities at the liquid milk contract price (plus any agreed level delivery premium—see explanation later); and second, contracts with no restriction on the daily variation of supplies. Contracts of the first type will cater for distributors with no facilities for the manufacture of milk products except on a very small scale. If any variation in daily supplies is permitted under this class of contract, it should be small—not exceeding, say, 5 per cent. above or below the contracted quantity. Contracts of the second type will meet the needs of manufacturers and of wholesalers with adequate conversion plants, and it will be for the Central Producers' Board to consider whether any, and if so, what, restriction should be placed on the number of these contracts permitted. The extra premium for level deliveries under contract is one which it is thought the distributor ought to pay because the service of providing a level delivery, day by day, is additional to that of the ordinary business of just selling whatever supplies of milk come along from the herd. Producers who would supply milk on a level delivery basis would thus be involved in higher costs than ordinary producers, and the Commission recommend that these men should be in a position to secure by negotiation with their buyers, premiums for this service over and above the normal contract price. Though the premiums would be paid along with the contract price to the Central Producers' Board, they would, subject to reservations made in the next paragraph, be allotted to the individual producers who made the contracts.

9. It is further suggested that the producer who elects to draw the level delivery premium shall be under the obligation to retain on the farm any surplus over his contract quantity of milk. If, however, he sells part of his dairy to buyers on a level contract basis, while

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disposing of the balance through the Central Producers' Board, the Commission suggests that an appropriate amount of the level delivery premium secured on his contract should be retained by the Board. The Board would also retain the power of supervising and approving any local or peculiar agreements which might be added to the normal form of contract.

10. To complete this brief sketch of the price plan recommended by the Commission there is still the explanation of the price to be paid by buyers of milk for manufacturing purposes and the special position of the producer-retailer in the sale of liquid milk. As regards milk for manufacture, the Commission recommend that the Central Producers' Board should adopt the principle of payment on the basis of the value of the milk when manufactured, taking into account the costs of manufacture and distribution. Prices would be fixed periodically by negotiation on the Joint Milk Council.

11. No provision is made for the payment of compensation to the milk producer who retains his milk on the farm for conversion into butter and cheese. So long as he does not sell milk such a producer is, in fact, outside the scope of the scheme, while the producer who sells milk for manufacture into butter and cheese in factories will be subsidized to the extent that he will receive the regional pool price. The Commission add that they have not made provision for compensation being paid to the farm manufacturer because of the difficulty of making feasible and practical proposals in the present unorganized condition of the farm cheese and butter industry. The Commission recommend that the Central Producers' Board should keep in close touch with any butter and cheese marketing organizations which may be established under the Agricultural Marketing Act, so as eventually to secure that the farm manufacture of cheese and butter would be assured of the equivalent of the regional universal price of milk.

12. To deal now with the position of the producer-retailer; he is an important element in the business since he is reckoned to be responsible for at least one-third of the total milk sales of the country. In any case, the Commission are quite definite that he cannot be left outside the scope of any milk scheme. Their recommendations concerning him are simple. In effect, the producer-retailer will, as a distributor, get the normal distributive margin of his region and, as a producer, approximately the equivalent of the regional pool price. It is proposed that as a producer he should pay the levy for inter-regional compensation and that for quality premiums. These levies will be deducted from the regional price at which the Board sells milk to the distributor, and the producer-retailer will pay nine-tenths of the difference between what remains and the regional pool price. The producer-retailer will be entitled, if qualified, to be registered on the roll of Accredited Producers and to draw the guaranteed quality premium. If he retains his surplus milk at home, he would also be entitled to the average level delivery premium for the region as declared by the Central Producers' Board.

13. Producers who do not keep more than four cows, or who do not sell their milk, are exempted from the purview of the scheme, as also are all sales by producers to their own employees. Other exemptions in special cases will be made on the authority of the Central Producers' Board. In the case of farmers' co-operative societies, these would be deemed to purchase their milk for retail sale from the Board in the same way as other wholesalers.

14. It may be convenient here to set out a summary of the main points of this price policy in the words of the Report taken from para. 102 (p. 109).

(1) The country shall be divided into regions.

(2) For each region there shall be fixed a Distributors' Liquid-Milk Buying Price—the Regional Contract Price.

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(3) Buyers' prices shall also be fixed for milk going to the different manufacturing channels.

(4) A Regional Universal Price, payable to all producers irrespective of the utilization of their milk, shall be calculated on the basis of regional realizations.

(5) There shall be a guaranteed premium on all milk sold by Accredited Producers, whether consumed liquid or manufactured.

(6) Normal premiums shall be recommended for graded milk and the premiums actually negotiated for such milk shall be credited to the individual producers concerned, who will receive, in addition, the guaranteed premium payable to Accredited Producers.

(7) There shall also be a level delivery premium payable to producers who contract for level supplies to distributors and secure such premium.

(8) Buyers' contracts will be of two types, viz.:—

(a) contracts for level quantities payable at the contract price for liquid milk, plus any premium for level deliveries;

(b) contracts for the purchase of such supplies as may be offered by contracting producers and for payments on a utilization basis.

(9) All sales of milk shall be subject to a levy for the fund to provide guaranteed quality premiums.

(10) All sales of milk for liquid consumption shall be subject to a levy, the proceeds of which shall be used for compensation as between regions.

(11) Inter-regional compensation shall be payable only in respect of the manufacturing season, and the allocation shall be on the basis of the quantities of milk manufactured in the several regions during such season.

(12) Producer-retailers shall contribute:—

(a) a consolidated levy covering the levy for guaranteed quality premiums and that for inter-regional compensation;

(b) nine-tenths of the contribution towards equalization within the region which is made, in effect, under the regional pools by other producers selling milk for liquid distribution.

They shall receive the average regional level delivery premium and shall be eligible to qualify for the guaranteed premium payable to Accredited Producers.

15. A Milk Marketing Scheme has been drafted by the National Farmers' Union and presented to the Minister in accordance with the Act. Though it differs in certain minor respects from the Draft Scheme prepared by the Commission and published as Appendix A of their Report, it is in substantial conformity with the recommendations made by the Commission and outlined above. Copies have been published and placed on deposit at the National Farmers' Union offices in order that all concerned may be given an opportunity of making objections or representations in respect to it. The period for these objections or representations has now expired, and those received will be considered at a public inquiry which will take place early in June. The Minister, after considering the report of the impartial person appointed to conduct the inquiry, and after making and securing approval to any modifications of the scheme, will submit it to Parliament. If Parliament approves it, a poll of producers will then be taken and, if the result is in favour of the scheme, it will straight-way come into full operation.

It is noted that the scheme is drawn up solely on behalf of the producer and has no reference to organization of the wholesale or distributing interests.

The Standing Committee hopes that the Council will support the scheme and that, if it becomes effective, the early stages of its operation will not be attended with serious difficulty. Once started and well understood by those operating it, it will become clear to the

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producer that many advantages will accrue to him. These include (a) the regular and certain payment for all delivered quantities of milk; (b) premiums for high quality and for level quantities; and (c) progressive improvement in the organization of his industry and the ultimate elimination of inferior milk, with the consequent growth of public confidence in an article which is at once the most complete and the cheapest of all foods.

On the subject of (c), the Council only at its last meeting in December, 1932, adopted a Report outlining for the industry a course of action to obtain greater purity in the milk supply. This scheme coincides largely with the proposals under the same head now made by the Commission, namely, the improvement of the system of veterinary examination of cows.

As regards the grading of milk, the Council in its Report adopted at the meeting on May 30, 1930, made recommendations for its simplification. These, however, are now superseded by the more thorough-going and satisfactory recommendations of the Reorganization Commission.

16. It remains for the existing unjust law which makes farmers responsible for the failure at any time of his cows to give the minimum of 3 per cent. fat in milk to be amended before the whole position in regard to milk production may be regarded as permanently set on a sound and rational basis. For the Council's views on this point members are referred to Reports dated May 30, 1930, June 11, 1931, and presented at the 33rd and 36th Meetings of the Council, respectively.

May 4, 1933.

APPENDIX II

REPORT FROM THE STANDING COMMITTEE OF THE COUNCIL OF AGRICULTURE FOR ENGLAND ON THE SUBJECT OF STANDARDS FOR CREAM

1. In the Report of the Markets Division of the Ministry of Agriculture on the Marketing of Butter and Cream (Economic Series No. 30), it is recommended that standards should be set up for the sale of cream. The same recommendation is also made in the Report of the Milk Reorganization Commission (Economic Series No. 38). The present position appears to be that cream is usually placed on the market in a highly concentrated form, and being—partly on that account—dear, is not regarded by the public as other than a luxury for special occasions, whereas in some other countries, where the sale of cream is in grades of lower butter-fat content, there has grown up a regular and constant demand for it day by day in almost every household. In these countries, the many domestic uses for cream, e.g., with breakfast cereals, with fruit and with coffee, for ice-cream, etc.—uses for which concentrated cream is unnecessary—are fully realized and exploited. Furthermore, the lower butter-fat grades of cream could be placed on the market in this country at prices which are well within range of the ordinary household. In the absence of the customary sale of these grades, evaporated milk and sterilized cream—most of which is imported from abroad—are used to some extent as substitutes.

2. In such circumstances as these, the Standing Committee considers that milk producers would be well advised to take steps to have placed upon the market cream of two or three standards, and that the grades for such should be defined under some commonly-accepted scheme. This could be done by specifying for definite named grades, a minimum butter-fat content in each, say 12 per cent. for Breakfast or Coffee cream, 25 per cent. for Fruit cream, and 50 per cent. for Thick or Whipping cream. For cream of the last-named

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grade it is estimated that about 16 gallons of milk are required to make one gallon of it, for 25 per cent. cream about 8 gallons of milk will be required and for 12 per cent. cream about 4 gallons. With milk costing, say, 1s. a gallon from the farmer, a 12 per cent. variety of cream should be able to be sold to the consumer at 9d. a pint. If this were done and the standards clearly marked in the shops so that people could get precisely the kind of cream they required at the corresponding prices, a great improvement in the trade would be effected, and an additional outlet for the disposal of milk would be created. It is significant that the present consumption of cream in this country is no more than one pint per head per annum.

3. Agreeing that standards are necessary, the question is how best to enact and control them. This could quite well be done by the Ministry of Agriculture by means of a National Mark, with defined grades of stated qualities, under the Agricultural Produce (Grading and Marking) Acts. This method would be entirely ideal for the purpose if it were the case that the country produced sufficient cream for all its requirements all the year round. It does not, however, at present do so. The fact is that, at present, large supplies of cream are obtained from the Irish Free State and Continental countries. Such imported cream could not, of course, be marked with the National Mark, and under present conditions it would be difficult, if not impossible, to work a scheme for the home-product alone. The situation would be different if, as a result of milk reorganization, this country became self-supporting in cream, in which case the Central Milk Producers' Board might be expected to play an important part in the administration of a cream standardization scheme on the lines indicated.

4. This leads to the second suggestion—to be regarded as an alternative only if it is decided that cream from other countries is permitted entry—that cream, both home-produced and imported, be dealt with under the new Agricultural Marketing Bill and that the same standards be laid down for use in the sale of both kinds. The National Mark would, of course, then only be necessary if it were deemed possible and desirable to differentiate between home-produced and imported.

5. In connexion, however, with the use of standards, either National Mark or other, it should be provided that:—

(1) the term "fresh cream" shall not be applied to any product other than cream (whether pasteurized or not) that has been obtained directly from fresh milk by the process of skimming or separating; and

(2) no cream that has been treated by heat above a maximum prescribed temperature or that has been treated by friction or pressure designed to break the fat globules and to give the impression of higher fat-content than it, in fact, contains, shall be sold under the description of "fresh cream" without the addition of the term "processed" or "treated," or some indication of the process that has been employed.

6. On the general subject of the laying down of cream standards, the following statement of the Reorganization Commission on Milk should here be repeated and emphasized: "In cream rests one of the greatest possibilities of increased milk consumption, and both producer and consumer should benefit through a reduction of the distributive margin to more reasonable proportions."

7. As regards ice-cream, the Reorganization Commission's Report considers that there is scope for further extending the consumption of milk and cream through its sale under proper regulations. The product has advanced rapidly in public favour in recent years, but is the absence of any legal requirements as to its constituents, milk and cream tend to give place to cheaper substitutes in its manufacture. The Standing Committee does not consider that this is the place to discuss the many difficulties of the ice-cream situation. A Central Milk

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Producers' Board would no doubt take up the question with the trade. In the meantime, the view of the Standing Committee may be stated that the interests both of the public and of home dairying will be served by prescribing a minimum percentage of butter-fat for ice-cream. No analytical means have been devised to distinguish between the use of fresh cream and artificial cream, but possibly some system of guarantees by manufacturers, backed by an examination of their records, would provide a sufficient check if it should be considered desirable to require the standard to be observed in terms of home-produced butter-fat. It is here that a National Mark Scheme for cream might be helpful.

May 4, 1933.

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Haymaking.—June hay has long enjoyed the reputation of being unsurpassed in feeding quality. Recent research on the nutritive value of grass at different stages of growth has done much to confirm this, and it is now customary to stress the necessity for an early hay harvest if the best quality product is desired. It is desirable, however, to recognize the necessity for balance in farming routine. Before engaging on the hay crop it is desirable to get as much as possible of the singling and hand hoeing of root crops done. This is all the more necessary where the available labour is limited. Since the introduction of the sugar-beet crop, there is a tendency to appreciate the advantage of earlier singling, even for mangolds, so that it becomes possible to finish extensive hand-labour operations on the root break a little earlier. Similarly, where marrow-stem kale is grown there is an appreciable reduction in labour requirements on the root break. The second factor that counts with many is the weight of crop. The increasing tendency to apply nitrogenous top-dressings to land intended for hay is serving to ensure a sufficiency of bulk. Bulk of crop is not so important as quality, and too often, in waiting for bulk, most of the fields get past their best, while frequently much good weather is lost also. If early cutting means a reduction in total crop, it is often the direct means of ensuring greater economy in the use of hay in winter, and this, combined with a correspondingly greater use of concentrates, is likely to give increased yields in dairy herds.

An early hay harvest, however, is not without its risks. The experiences of 1932, which found many ready to start haymaking before the grass had reached its normal

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maturity, were responsible for an unusually large number of stack fires, and this despite apparently good haymaking weather. One has to remember that grass with a low fibre content is more difficult to "cure" than grass that has reached maturity.

Good weather is probably the most important factor in the making of good hay, and it would always appear to be sound policy to take advantage of a fine spell even if the crop has not reached that state of maturity or bulk which has hitherto been regarded as desirable. There has been much discussion in recent years as to the best means of harvesting hay in an unfavourable season. During the past four years the writer has experimented with the use of salt. Salting is a very old practice, for John Tuke in his report to the Board of Agriculture on the Agriculture of the North Riding of Yorkshire (1800), refers to the great advantage resulting especially "when it has received much rain in the field and particularly the second crop of clover. The salt checks the fermentation and prevents moulding. If straw be mixed with such hay, the heating of the stack is still further prevented by the straw imbibing the moisture. Cattle will eat such salted hay and even the straw mixed with it more eagerly than better hay not salted, and thrive faster upon it." It is interesting to observe that on the Continent, lucerne stacks are occasionally built with a foundation of straw one foot deep, upon which a layer of three feet of lucerne hay is placed and followed by another foot of straw and so on until the stack is completed. The modern users of salt, however, do not regard it as a method of making weathered hay more palatable, but rather as a means of carrying the crop in a less cured form than is normally regarded as safe. Thus, Mr. Christopher Turnor, in describing the making of lucerne hay (*Jour. R.A.S.E.*, 1929), intimates that the mown lucerne "should not be allowed to remain in the swath more than twenty-four hours, or the leaves, which are the most palatable and nourishing part of the plant, will fall off and be lost. As soon as it is well wilted, it should be made into small cocks and finally put into the stack much greener than is the ordinary custom in this country. About 28 lb. of agricultural salt should be sprinkled over every load as it is put into the stack. This prevents mildewing and overheating." Attention has already been directed in this JOURNAL to the French system of salting hay, known as the Solages

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method.* This system provides for the use of salt up to the rate of 90 lb. per ton of hay, depending on the degree of moisture present in the hay. On the farm of the Midland Agricultural College, salt has been used at varying rates up to about 28 lb. per ton of hay put in the stack, and in three out of the four years it has satisfactorily controlled the temperature of the stacked hay. It was not successful, however, in this direction in 1932.

The Quality of Milk.—The Sale of Milk Regulations provide that a sample of milk that contains less than 3 per cent. of milk-fat or less than 8.5 per cent. of milk-solids other than milk-fat is presumed not to be genuine until the contrary is proved. It is a common experience in some herds, particularly at this time of the year, that the fat percentage of the morning's milk is on the border line of the presumptive legal minimum. This is amply illustrated in the range of fat variations in the machine-milked herd of the Midland Agricultural College in the month of June for the last three years.

<i>Year.</i>	<i>Hours of Milking.</i>	<i>Morning. Fat per cent.</i>	<i>Evening. Fat per cent.</i>	<i>Number of times below 3.0 per cent.</i>
June, 1930	6 a.m.	2.9—3.5	3.75—5.1	I
	3.30 p.m.			
June, 1931	6 a.m.	2.7—3.2	3.5—4.3	II
	3.45 p.m.			
June, 1932	5.45 a.m.	2.85—3.4	3.0—3.65	8
	5.30 p.m.			

Although the milk producer has the right "to appeal to the cow" if threatened with prosecution for low butter fat content, it is increasingly necessary to recognize that it is not in the best interests of producers to remain satisfied with a herd performance that may give rise to milk of low quality. Various factors may effect a reduction in the fat content, such as a high proportion of cows calving in spring and early summer; uneven hours of milking; defective stripping; and the influence of weather. The equalizing of milk in different churns by more accurate bulking before or after the milk leaves the cooler is very desirable as an additional safeguard, but, apart from factors that are beyond the control of the dairy farmer, it is becoming increasingly necessary that breeders of dairy bulls should pay more attention to the quality of milk produced by bull-breeding dams. That there is scope for selective work

* This JOURNAL, January, 1932, page 1063.

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of this character is emphasized by the variation in performance of cows of proved yielding qualities. Thus, in the above-mentioned herd, 18 grading-up cows which in the milk-recording year 1931-32 averaged 777 gallons of milk were split up into the following groups on the basis of quality on monthly tests.

<i>Fat per cent.</i>				<i>No. of Cows</i>
3.21—3.25	..	..	..	2
3.26—3.50	..	..	..	6
3.51—3.75	..	..	..	3
3.76—4.00	..	..	..	6
4.01—4.25	..	..	..	1

The Flock.—June is usually an easy month with the flock, though this does not mean that it should be the excuse for neglect. The normal routine work will include the conclusion of shearing, the weaning of lambs, and summer dipping. In most grassland flocks footrot is one of the most serious scourges. In its worst form it is highly contagious and a lame sheep is a source of much trouble. It is not easy to compute the actual damage caused, though apart from the time occupied in treating the disease it quickly reduces the thriftiness of affected animals. The best preventive is regular and systematic attention to the feet. Paring the overgrown hoof is the first essential, while running the flock through a foot-bath at regular intervals is the most economical method of treatment. Foot-baths may be made from wood, concrete or galvanized iron. Suitable sizes are 16 ft. long, with a width of 8 in. at the base and 10 in. at the top, and a depth of about 8 in. Suitable side fencing should be arranged so that the sheep can be driven through the trough without difficulty. It is an advantage if the bottom of the trough can be grooved so as to open the hoofs of the sheep as they pass through the foot-bath, while in the case of wooden troughs cross pieces attached to the bottom prevent slipping. Various materials are employed for treatment, the commonest being the use of 1 lb. of powdered copper sulphate per gallon of water. Copper sulphate is not suitable for use with a galvanized iron trough and when such a trough is used it is necessary to employ an arsenical sheep dip or a good disinfectant fluid. Another good mixture for wooden and concrete baths is 1 lb copper sulphate and 1½ lb. washing soda to 2 gallons of water. Exception is sometimes taken to the use of a foot-bath with nursing ewes

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because splashing of the udder sometimes occurs. This can be avoided by mixing straw chaff with the liquid.

It has been suggested that foot-rot is more prevalent in some breeds than others. A sheep with a soundly developed hoof is undoubtedly less susceptible than one with a badly developed hoof. This would indicate that there is a need for greater attention to this problem by selective breeders, though there is no breed that is immune to the trouble.

Fallow Crops.—Although it is customary to regard the growing of fallow crops as a means of providing food for live stock, particularly for autumn and winter, as well as of yielding selling-off crops such as sugar-beet and potatoes, it is still essential to treat them as cleaning crops on most farms. Within recent years the viewpoint has gained some weight that the old-fashioned root crops are too costly in labour requirements. It is desirable, however, to recognize that it is very difficult to arrive at accurate costs of production under mixed farming conditions. The fallow crop may frequently be regarded as a means of utilizing labour that would otherwise not be satisfactorily employed. Labour economies are necessary on the majority of farms, and it is this aspect that is serving to make the kale crop more popular among dairy farmers. After singling and hand hoeing have been completed the main work on the fallow crops consists of horse-hoeing. The effectiveness of this depends on its frequency and the availability of weather suitable to ensure the killing of the weeds. Top-dressing with a nitrogenous fertilizer is invariably an economic expenditure, though with most fallow crops this will usually be applied before the middle of June. Kales and cabbages are particularly responsive, even in quantities up to 4 cwt. per acre. Sugar-beet will repay the application of up to 3 cwt. per acre of nitrogenous fertilizer, applied partly before sowing and partly after singling. There is still some uncertainty as to whether marrow-stem kale should be singled or not. Experimental evidence indicates that the greatest weight of crop is derived from crops not singled, although perhaps roughly thinned if necessary. Kale growing has certainly extended because both singling and hand hoeing are unnecessary, while the smothering effect of this crop on the weed population is perhaps one of its greatest assets, since for this purpose it has no rival.

PRICES OF ARTIFICIAL MANURES

Description	Average price per ton during week ended May 10				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 8 16d	£ 8 16d	£ 8 16d	£ 8 16d	s. d. 11 4
„ „ Granulated (N. 16%) ..	8 16d	8 16d	8 16d	8 16d	11 0
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 10d	6 10d	6 10d	6 10d	6 4
Calcium cyanamide (N. 20.6%) ..	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 10	3 5	3 2	3 7g	4 9
Potash salts (Pot. 30%) ..	5 13	5 10	5 7	5 11g	3 8
„ „ (Pot. 20%) ..	4 1	3 17	3 14	3 19g	3 11
Muriate of potash (Pot. 50%) ..	10 9	10 2	9 15	10 5g	4 1
Sulphate „ „ (Pot. 48%) ..	12 5	12 0	11 15	12 3g	5 1
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%)||	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	3 2	..	3 4	2 16k	3 6
„ „ (S.P.A. 13½%) ..	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3¼%, P.A. 20½%) ..	6 10	6 5	6 7f	6 7	..
Steamed bone-flour (N. ¾%, P.A. 27½-29½%) ..	5 15	5 7	5 2f	5 2	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 85% through standard sieve.

a Prices for 4-ton lots f.o.r.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, and for lots of 10 cwt. and under 1 ton 15s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

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NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
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Pig Recording : Feeding in Relation to Litter Weights.—There has been much discussion recently on the subject of pig recording. Organizations in different counties have initiated schemes with the object of recording certain data concerning pigs. Generally, these schemes provide for records of the number of pigs born and reared per litter, the weight of the pigs at some time up to 8 weeks old, and in certain cases, the weight for age at the time of slaughter, for pork or bacon; while there may or may not be some attempt to ascertain the amount of food required to produce a certain live or carcass weight.

The age at which pigs are weighed before weaning has varied with different recording societies. In some instances it is at 3 weeks old, as in Sweden, but in others the weighing is variously carried out at 4 weeks, or 6 weeks, or 8 weeks old, the last-mentioned being chosen because it is the age at which weaning ordinarily takes place in commercial herds.

It is obviously very desirable that there should be uniformity of schemes throughout the country, particularly as regards the age at which weighings are made up to the time of weaning. The weight at 3 weeks old is looked upon as giving the best measure of the sow's milking and rearing capacity, as up to 3 weeks little pigs normally subsist on their mother's milk. The size and weight of the litter at 3 weeks old provides information comparable with that provided by milk recording in the case of dairy cattle. After 3 weeks old, litters are usually given trough food additional to their mother's milk, so that their weight at weaning gives some information on the rearing capacity of the sow, and is also a measure of the efficiency of management in the pre-weaning period. The nature of the supplementary food, and the kind of management between 3 or 4 weeks old and 8 weeks old, does, however, obscure the sow's true capacity as a milker, and it is surely on the sow's natural abilities that data are most required to help us in the selection of breeding stock.

It is desirable that it should be clear to those who are promoting schemes that provide for weighing the litter at 8 weeks only, that there is possibility of considerable harm

NOTES ON FEEDING

being done as regards pigs intended for breeding, if special importance is attached to high weights at 8 weeks old. The writer's attention has been drawn to abnormally high weights secured for individual pigs and litters at this age. In the case in point, the owner was out to get impressive figures, and the feeding and management were arranged solely to this end. If pigs are fed frequently on a ration containing new milk one may get an interesting demonstration of what can be done in the way of obtaining abnormally high weights; but the practice is disquieting as it is the kind of thing that may happen if figures for litter weights at 8 weeks old should be used for purposes of advertisement.

Breeders of dairy cattle realize that forcing and high feeding of young dairy stock, both male and female, is undesirable, and in the case of heifers has a prejudicial effect upon their subsequent milking capacity. Over-feeding, particularly in the early stages of life, resulting in stock becoming over-fat, is regarded as a cause of sterility in farm animals. In *The Veterinary Journal*, Vol. 89, No. 4, Pugh is quoted as having drawn attention to the pathological changes observed in the thyroid gland in sterile cattle. The relationship of this gland to the ovaries is stated to be so intimate that normal ovarian development and function are scarcely possible if thyroid secretion is not normal. Sterility arising from obesity is stated to be nearly always due to otherwise unnoticed thyroid deficiency. The thyroid gland may be seriously affected in pigs through over-feeding in the early stages, with consequent excessive fatness. Apart altogether from sterility and lack of milking capacity, little pigs that have been over-fed in the early part of their life have almost invariably done badly, later on, if kept for breeding. Feeding for maximum weight at 8 weeks old, may not seriously affect pigs to be slaughtered for pork at, say, 16 weeks old, but it is unquestionably dangerous with pigs intended for breeding. Hence it is important that organizations that promote pig recording schemes should consider this aspect of the matter very carefully before finally deciding upon litter weighings at 8 weeks of age.

The weight of the litter at 3 weeks old cannot be influenced to any appreciable extent by extra feeding of the little pigs. Any attempt to force them to consume extra milk or other food is likely to be harmful and to

NOTES ON FEEDING

result in digestive disorders or scour. For this, and the other reasons given above, the weight at 3 weeks old may be regarded as the safest and most valuable one for guidance in the selection of breeding stock. In this connexion it is significant that, in certain instances, where weighings were made at 4 weeks old at the outset, the change-over to weighing a week earlier has now been made.

It should be recognized that weighing at 4 weeks, 6 weeks, or any other age appears to have nothing to recommend it, except possibly convenience in the actual carrying out of the routine work of a recording scheme.

Rations for Calves intended for Beef Production.—

In the past three years interesting trials in the rationing of calves have been carried out by the Agricultural Organizer of Banffshire. This county has long been noted for its stores and beef cattle. It has been customary to allow a fairly liberal quantity of milk to calves being reared for young beef production; and one of the objects of the trials was to demonstrate methods of rearing that, while limiting the quantity of milk, would produce a calf that could be carried on satisfactorily for young beef. The calves were allowed about 50 gallons of new milk each. At the age of 3 to 4 weeks the calves were given dry food at the rate of $\frac{1}{4}$ lb. per day. The calves were weaned at 8 weeks old, when they were eating about $1\frac{1}{2}$ lb. of concentrated food per day, and this was gradually increased until the quantity was $2\frac{1}{2}$ lb. daily at 12 weeks old. Up to this age, the calves were given Mixture No. 1: 1 fish meal, 4 linseed cake, 5 crushed oats (parts by weight). After this age, the food was changed to Mixture No. 2: 1 fish meal, $2\frac{1}{2}$ linseed cake, $6\frac{1}{2}$ crushed oats.

The first mixture proved rather laxative when the calves were on fresh grass in summer, but was otherwise satisfactory. The tendency to cause scouring was corrected by cutting down the fish meal as well as the linseed cake. but no attempt seems to have been made to replace them with a food of comparable composition, flaked maize being the food added to the mixture. In this connexion, an interesting question arises as to whether young succulent grass is sufficient to replace in part the protein-rich foods, and linseed cake in particular, even in the case of young calves. In reporting on the trials, the Agricultural Organizer stresses the importance of providing a continuous

Description	Price per ton	Manu- rial value per ton	Food value per ton	Starch equiv. per 100 lb.	per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
Wheat, British	£ 8	£ 8	£ 8	72	1 4	0.71	9.6
Barley, British feeding	5 5	0 8	4 17	71	1 4	0.71	6.2
„ Canadian No. 3 Western ..	5 10	0 8	5 2	71	1 5	0.76	6.2
„ „ „ 4 ..	5 7	0 8	4 19	71	1 5	0.76	6.2
„ Argentine	5 8	0 8	5 0	71	1 5	0.76	6.2
„ Persian	5 0*	0 8	4 12	71	1 4	0.71	6.2
„ Russian	5 0*	0 8	4 12	71	1 4	0.71	6.2
Oats, English white	6 0	0 8	5 12	60	1 10	0.98	7.6
„ „ black and grey	6 0	0 8	5 12	60	1 10	0.98	7.6
„ Scotch white	6 10	0 8	6 2	60	2 0	1.07	7.6
„ Canadian No. 2 Western ..	6 2	0 8	5 14	60	1 11	1.03	7.6
„ „ No. 3	5 18	0 8	5 10	60	1 10	0.98	7.6
„ „ mixed feed	5 2	0 8	4 14	60	1 7	0.85	7.6
„ Argentine	5 3	0 8	4 15	60	1 7	0.85	7.6
„ Chilian white	7 15†	0 8	7 7	60	2 5	1.29	7.6
„ Danubian	4 15§	0 8	4 7	60	1 5	0.76	7.6
Maize, Argentine	4 12	0 8	4 4	78	1 1	0.58	7.6
„ American	4 8†	0 8	4 0	78	1 0	0.54	7.6
„ Russian	4 3§	0 8	3 15	78	1 0	0.54	7.6
„ South African	4 3§	0 8	3 15	78	1 0	0.54	7.6
Beans, English winter	5 10§	0 19	4 11	66	1 5	0.76	19.7
Peas, Japanese	26 0†	0 17	25 3	69	7 3	3.88	18.1
Dari, Egyptian	6 0†	0 9	5 11	74	1 6	0.80	7.2
Milling offals—Bran, British	4 17	0 19	3 18	43	1 10	0.98	9.9
„ „ broad	5 15	0 19	4 16	43	2 3	1.20	10
„ Middlings, fine imported	4 15	0 14	4 1	69	1 2	0.62	12.1
„ „ coarse British	5 2	0 14	4 8	56	1 7	0.85	10.7
„ Pollards, imported	4 10	0 18	3 12	62	1 2	0.62	11
Meal, barley	7 0	0 8	6 12	71	1 10	0.98	6.2
„ „ grade II	6 5	0 8	5 17	71	1 8	0.89	6.2
„ „ maize	5 12	0 8	5 4	78	1 4	0.71	7.6
„ „ South African	4 15	0 8	4 7	78	1 1	0.58	7.6
„ „ germ	5 12	0 13	4 19	79	1 3	0.67	8.5
„ „ locust bean	6 12	0 6	6 6	71	1 9	0.94	3.6
„ „ bean	8 0	0 19	7 1	66	2 2	1.16	19.7
„ „ fish	15 0	2 13	12 7	59	4 2	2.23	53
Maize, cooked flaked	5 15	0 8	5 7	84	1 3	0.67	9.2
Linseed cake, English, 12% oil ..	8 10	1 3	7 7	74	2 0	1.07	24.6
„ „ „ 9% „ ..	8 5	1 3*	7 2	74	1 11	1.03	24.6
„ „ „ 8% „ ..	8 0	1 3	6 17	74	1 10	0.98	24.6
„ „ „ Indian 7% „ ..	7 10†	1 3	6 7	74	1 9	0.94	24.6
Soya-bean cake, 5½% oil	7 17†	1 12	6 5	69	1 10	0.98	36.9
Cottonseed cake—English, Egypt- tian seed, 4½% oil	5 17	1 3	4 14	42	2 3	1.20	17.3
„ „ English, Indian seed, 4% oil ..	5 15§	1 3	4 12	42	2 2	1.16	17.3
„ „ „ Egyptian, 4½% oil	5 10	1 3	4 7	42	2 1	1.12	17.3
„ „ „ decorticated 7% „	7 5†	1 13	5 12	68	1 8	0.89	34.6
„ „ „ meal, decorticated 7% „	7 5†	1 13	5 12	68	1 8	0.89	34.6
Coconut cake, 6% oil	6 10†	1 0	5 10	77	1 5	0.76	16.4
Ground-nut cake, 6-7% oil ..	6 7	1 1	5 6	57	1 10	0.98	27.3
„ „ „ decor. 6-7% oil	7 17	1 11	6 6	73	1 9	0.94	41.3
Palm-kernel cake, 4½-5½% oil ..	6 5†	0 13	5 12	73	1 6	0.80	16.9
„ „ „ meal, 4½% oil	6 5†	0 13	5 12	73	1 6	0.80	16.9
„ „ „ meal, 1-2% oil ..	5 15	0 14	5 1	71	1 5	0.76	16.5
Feeding treacle	5 0	0 9	4 11	51	1 9	0.94	2.7
Brewers' grains, dried ale	4 2	0 14	3 8	48	1 5	0.76	12.5
„ „ „ porter	3 15	0 14	3 1	48	1 3	0.67	12.5
Dried sugar beet pulp (a)	5 5	0 7	4 18	66	1 6	0.80	5.2

* At Bristol. † At Liverpool. § At Hull. (a) Carriage paid in 4 ton lots.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of April, 1933, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 23s. per ton as shown above, the food value per lb. of starch equivalent is £8 17s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.29d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculation a buyer can determine which feeding stuff gives him the best value at the prices quoted on

FARM VALUES OF FEEDING STUFFS

supply of fresh clean drinking water, the necessity for care in restricting the food to the prescribed quantities, the need to make all changes in feeding very gradually, to observe strict punctuality in feeding, and to keep the troughs scrupulously clean. These are fundamental points that should be carefully observed by all who would feed stock satisfactorily.

It is stated that the calves reared in this way may not have looked quite so well as suckled calves, but in all instances their subsequent progress was highly satisfactory.

Feeding Stuffs.—In the feeding-stuffs market, maize products, barley and palm-kernel meal continue to be relatively cheap. Advantage of the lower prices of these foods should be taken in the making up of rations; considerable economies can be effected by employing them as fully as possible in rations for pigs.

* * * * *

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent Per cent.</i>	<i>Protein equivalent Per cent.</i>	<i>Per ton £ s.</i>
Barley (imported)	71	6·2	5 5
Maize	78	7·6	4 6
Decorticated ground-nut cake	73	41·3	7 17
„ cotton cake	68	34·7	7 5
(Add 10s. per ton, in each case, for carriage.)			

The cost per unit starch equivalent works out at 1.24 shillings, and per unit protein equivalent, 1.94 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The “ food values,” which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the ration-

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

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ing of dairy cows, are given in the November, 1932, issue of the Ministry's JOURNAL, p. 781.)

FARM VALUES.

CROP	Starch equivalent	Protein equivalent	Food value per ton, on farm	
	Per cent.	Per cent.	£	s.
Wheat	72	9.6	5	8
Oats	60	7.6	4	9
Barley	71	6.2	5	0
Potatoes	18	0.8	1	4
Swedes	7	0.7	0	10
Mangolds	7	0.4	0	9
Beans	66	19.7	6	0
Good meadow hay	37	4.6	2	15
Good oat straw	20	0.9	1	7
Good clover hay	38	7.0	3	1
Vetch and oat silage	13	1.6	0	19
Barley straw	23	0.7	1	10
Wheat straw	13	0.1	0	16
Bean straw	23	1.7	1	12

MISCELLANEOUS NOTES

World's Grain Exhibition and Conference, Regina

THE Conference which is being held at Regina, concurrently with the World's Grain Exhibition, is to open with a business session on July 21, and to continue until August 4, 1933. The official opening and the first meeting of technical groups will take place on July 25, and thereafter technical groups will meet on succeeding afternoons, while grain economic problems will be discussed daily in general session. The following have been nominated to represent His Majesty's Government at the Conference:—

Sir A. D. Hall, K.C.B., LL.D., F.R.S., Chief Scientific Adviser to the Ministry of Agriculture, Director of the John Innes Horticultural Institution.

Sir E. John Russell, D.Sc., F.R.S., Director of the Rothamsted Experimental Station.

Mr. William Robb, N.D.A., F.R.S.E., Director of the Research Station of the Scottish Society for Research in Plant Breeding, Corstorphine, Edinburgh.

MISCELLANEOUS NOTES

Export of Breeding Stock

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during the three months ended March, 1933, compared with the corresponding period of 1932. (From returns supplied by H.M. Customs and Excise).

	1933		1932	
	Number	Declared value	Number	Declared value
CATTLE		£		£
Argentina	—	—	12	1,050
Germany	3	301	—	—
Portugal	—	—	5	294
Russia	—	—	115	4,334
Australia	16	1,547	7	3,355
Canada	4	400	38	2,536
Irish Free State ...	89	2,219	176	4,653
Kenya	6	236	8	519
Southern Rhodesia ...	—	—	2	179
Union of South Africa ...	3	485	21	2,228
Other countries ...	—	—	17	330
Total	121	5,188	401	19,478
SHEEP AND LAMBS				
Argentina	—	—	85	1,625
Belgium	6	48	—	—
Brazil	36	900	8	182
France	4	50	53	370
Uruguay	—	—	17	235
Australia	1	60	5	350
Canada	16	480	14	240
Irish Free State ...	—	—	45	210
Kenya	3	189	—	—
Union of South Africa ...	10	45	3	18
Other countries ...	—	—	1	7
Total	76	1,772	231	3,237
SWINE				
France	4	57	8	99
Hungary	—	—	2	20
Japan	6	289	2	100
Poland	7	105	—	—
Portugal	—	—	2	40
Australia	3	63	3	90
Channel Islands	3	25	—	—
Irish Free State ...	—	—	276	1,083
Union of South Africa ...	—	—	6	129
Other countries ...	2	40	1	13
Total	25	579	300	1,574

MISCELLANEOUS NOTES

Lands Improvement Company Loans

THE Lands Improvement Company have notified the Ministry that their rates of interest in respect of approved applications for loans under the Improvement of Land Acts have been reduced from $4\frac{1}{8}$ per cent. net to $3\frac{7}{8}$ per cent. net in the case of loans of £500 and upwards, and from $4\frac{3}{8}$ per cent. net to 4 per cent. net for loans of less than £500.

The Agricultural Index Number

THE general index number of agricultural produce for April at 105 was 3 points higher than a month ago but was 12 points below the figure recorded in April, 1932. The advance of 3 points on the month was due almost entirely to a rise in the index for milk.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	—
June	153	140	131	123	111	—
July	145	141	134	121	106	—
August	144	152	135	121	105	—
September	144	152	142	120	104	—
October	139	142	129	113	100	—
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—During April wheat was 1d. dearer at 5s. 2d. per cwt. but as this increase was less than that which occurred in the pre-war period, the index was reduced 1 point to 68. Barley was unchanged in price at 6s. 3d. per cwt. but a fall occurred in April, 1911-13, and in consequence the index appreciated 3 points to 82. At 5s. 9d. per cwt., oats were 2d. cheaper and the index was 3 points lower at 81. A year ago wheat averaged 6s. per cwt., barley 7s. 9d. and oats 7s. 5d., the relative indices being 79, 101 and 105.

Live Stock.—Fat cattle at an average of 36s. 7d. per live cwt. for second quality sold at precisely the pre-war value; a very slight fall in price occurred between March and April this year whereas in the base period there was a seasonal advance. No alteration occurred in the average quotation for fat sheep over that recorded in March, but the index rose 4 points to 116, owing to the reduction which took place in April, 1911-13. Bacon pigs were 2d. per score dearer and the index showed a rise of 2 points to 112 but porkers cheapened by 3d. per score and were 2 points lower at 116.

MISCELLANEOUS NOTES

The seasonal decline in the value of milking cows was again proportionately greater than in the base period and the index depreciated 3 points to 106, while store cattle again failed to show the advance in price usual at this season of the year and the index was further reduced by 4 points to 99.

Other Commodities.—The average price for milk sold under contract in April was nearly $1\frac{1}{2}d.$ per gallon lower than in March but as there was a reduction of $2\frac{1}{2}d.$ per gallon in the corresponding period of the base years the index figure was 24 points higher at 153. In April last year, the rise in the index was 33 points to 150. The decline in the price of butter was rather more pronounced than in the pre-war period and the index was 2 points below that for March at 9 per cent. less than in 1911-13. Cheese was 11 per cent. above the level of the base years. The seasonal fall in the price of eggs was much heavier than usual and the index declined 8 points to 93; a year ago an advance of 3 points to 107 was recorded.

Potatoes realized about 3s. 6d. per ton less in April than in the previous month and as a rather sharp advance occurred in the base period, the index showed a substantial drop of 19 points to 87.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	Apr.	Apr.	Jan.	Feb.	Mar.	Apr.
Wheat	68	79	72	71	69	68
Barley	98	101	87	84	79	82
Oats	85	105	84	85	84	81
Fat cattle	120	118	110	107	105	100
„ sheep... ..	137	103	107	106	112	116
Bacon pigs	123	100	99	98	110	112
Pork „	140	109	110	109	118	116
Dairy cows	128	119	113	111	109	106
Store cattle	123	115	107	107	103	99
„ sheep	131	89	83	82	85	84
„ pigs	163	104	121	117	122	123
Eggs	118	107	94	117	101	93
Poultry	142	127	121	122	129	124
Milk	153	150	155	150	129	153
Butter	115	111	97	100	94	91
Cheese	124	139	119	113	110	111
Potatoes	182	239	116	113	106	87
Hay	90	68	65	65	66	66
Wool	84	69	64	63	62	62

MISCELLANEOUS NOTES

Poultry-keeping on the Farm

UNDER the above title, progress reports on the poultry-keeping demonstration at Stanmore, Middlesex, have been published at intervals in this JOURNAL.* The following note, communicated by Mr. J. Worthington, County Poultry Instructor for Middlesex, concludes the reports on the demonstration, which was started in July, 1930, and ended last autumn.

The objects of the experiment, for which Sir John Fitzgerald generously provided land and funds, were to test the merits of large, slatted-floor houses for egg production; and to investigate, as an economic policy, initial stocking with first-cross, three-months-old pullets and their retention for a second year. Particulars of the housing and management problems have been fully dealt with in previous notes; this final report summarizes a few general conclusions, and some of the financial aspects, which Mr. C. Pringle, N.D.A., C.D.A., of the Department of Agricultural Economics, Reading University, has noted throughout the demonstration.

Plant and Lay-out.—The plant was laid out on Mr. F. G. Paynter's system of blocks of pens, each pen formed by netting, 4 ft. high, surrounding a single house for 50 to 60 layers, with very simple gates giving access between adjoining pens and to gangways. In the second year, the free-range system was tested with hens only. Comparing the two systems, the results in health and egg-production were similar, although there was a decided tendency to crowd under free-range conditions on account of the absence of fencing. Haymaking was, however, much simpler, an advantage that may or may not outweigh the lessened risk of infection afforded by the small, separate unit. It is felt, however, that, particularly where inexperienced labour is employed, a simple system of fencing, costing about 1s. per bird (this should be possible with low netting and chestnut paling) is an insurance against zymotic disease; but the fencing must be light and mobile in the interests of the herbage and, ultimately, of the birds.

Stocking.—The rate of stocking adopted, 200 birds to the acre, was undoubtedly too high and, for the future (the plant is still in existence) 100 is nearer the number to be

* 1931: May (p. 217); July (p. 447); September (p. 669); December (p. 962); 1932: July (p. 390).

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aimed at. It cannot be too strongly emphasized that poultry farming is husbandry and that rent is cheaper than disease.

Disease.—Outbreaks of infectious disease were not experienced, although casualties from other causes were high. Ovarian troubles accounted for most of these, followed as to numbers by dropsy and allied diseases.

Housing.—As regards health, blame cannot be attributed to the housing; but experience with the large, slatted-floor house suggests the following criticisms. The size and cost are regarded as excessive. Headroom is unnecessary for an attendant who seldom has occasion to enter. Three wheels would be better than four. Roof-lighting can be recommended; it is cheap to fix and out of reach of other stock. The feeding arrangements, giving access to dry mash hoppers both from inside and outside, are unnecessarily elaborate and expensive. There seems to be no reason why all food should not be given at ground level, as few of the birds under trial fed inside, or used the alighting boards from which to feed outside. Particularly was this the case when wet mash was fed.

Size is linked up, also, with one of the chief drawbacks of this type of slatted-floor house—the difficulty of handling birds. With the present narrow margin between profit and loss, a house should be so designed as to facilitate rapid, easy culling. In this respect, the Sussex Night Ark would seem to be pre-eminent. It is light (it could, with advantage, be made lighter), cheap, and has a long life. With skids at the ends, not along the sides, it can be moved daily and single-handed. Separate laying accommodation, however, is advisable in the interests of ensuring clean eggs. Should flocks of 50 be preferred, two arks can be placed close together, the entrances facing. In a subsidiary experiment, the results, both with single and double arks, at less than half the cost and with no more labour, compared favourably with those from large houses.

Financial Results.—In the first year, the 1,000 pullets produced 175,000 eggs and gave a net profit of £387, allowing for all charges, including depreciation of stock. The following year, the flock, consisting of 750 yearlings and 250 pullets bought-in, gave a profit of £87, roughly one-quarter that of the previous year. As the pullet strength was also one-quarter that of the previous year, the inference is that the *hens* contributed little, if anything, to the profits.

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It is obvious, in fact, from Mr. Pringle's quarterly figures, that had the hens been sold, or even destroyed, when they went out of lay in the autumn, the returns would have been unaffected. It would seem, therefore, that the retention of yearlings was not justified, and that, in view of the trend of wholesale egg prices, it would be more economical to buy-in pullets each year. The source of such pullets must, naturally, be above suspicion, and it is suggested that advantage be taken of the Accredited Breeding Scheme, as operated in several counties, failing which, the opinion of the poultry instructor for the particular county might be invited.

The failure of the hens at Stanmore was undoubtedly due to the moult and not to the type of housing. As the price of hens (and a yearling is a hen) falls from Easter onwards, reaching its lowest point in the autumn, when the market is glutted, it would seem more profitable to dispose of all the yearlings at an early date—say June, at the latest. They are then in full lay, good condition and worth 3s. apiece or more. At this figure, they should prove a good investment for a specialist, with electric lighting installation, and a market for boiling-fowls, for which the birds would eventually be destined.

Had this policy of selling the yearlings been adopted at Stanmore in June, 1931, a sum of £135 for the 900 fowls (3s. per head) would have been obtained. This, added to the gross profit, £462, on June 30, would have made £597 available for replacements by pullets, costing, if bought immediately, £300 (6s. per head), or if bought in September, £400 (8s. per head). Profit, in either instance, would have been about £200 per annum. Admittedly, this is less, by £37 per annum, than that actually realized ($£387 + £87$ divided by 2), but this is offset by a considerable saving of labour and depreciation on spare houses for the accommodation of growing pullets. The obvious criticism of this policy is that the continuity of the supply of eggs is interfered with; but this difficulty should not be insuperable. On the other hand, such a scheme releases a hand for the harvest; avoids the risk of overcrowding, the most frequent cause of summer colds; and gives ample time for renovating the houses and moving them to fresh ground without risk of upsetting the laying stock. It is a simple system and, as near as can be, safe.

A full report on the demonstration has been published,

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and copies can be obtained (price 6d. post free) from the Middlesex Agricultural Education Committee, 10, Great George Street, Westminster, London, S.W.1.

The National Diploma in Agriculture and the Fream Memorial Prize

THE thirty-fourth annual examination for the National Diploma in Agriculture was held, under the auspices of the National Agricultural Examination Board, at the University of Leeds from April 19 to 26, 1933, when 138 candidates presented themselves. Of these, five took the whole examination; 73, having already passed in certain subjects, appeared to take the remainder; and the other 60 came up for a first group of subjects.

The Diploma was awarded to 50 candidates, of whom one, Mr. A. J. Thompson, from the South-Eastern Agricultural College, Wye, Kent, obtained honours. Two of the successful candidates were women. In the examination in a first group of subjects, 32 candidates were successful and are, therefore, entitled to take the remaining subjects in either 1934 or 1935. The training colleges of the successful candidates were as follows:—

<i>College</i>	<i>Diploma</i>	<i>1st Group of subjects</i>
Armstrong College, Newcastle	1	1
East Anglian Inst. of Agric., Chelmsford ..	3	—
Harper Adams Agric. College, Newport, Salop ..	5	5
Leeds University	7	4
Midland Agric. College, Sutton Bonington ..	2	5
Reading University	2	1
Royal Agric. College, Cirencester	—	1
Seale-Hayne Agric. College, Newton Abbot ..	11	4
South-Eastern Agric. College, Wye, Kent ..	5	3
University College, Aberystwyth	4	—
Edinburgh & East of Scotland Coll. of Agric. ..	1	1
Glasgow University	3	3
West of Scotland Agric. College, Glasgow ..	5	4
Non-Collegiate (Scotland)	1	—
	—	—
	50	32
	—	—

The Fream Memorial Prize, which is awarded in connexion with the examination to the candidate who obtains the highest marks, was secured by Mr. A. J. Thompson, who, as mentioned above, obtained the Diploma with Honours. The Prize, of an approximate value this year of £8, is provided from a fund entrusted to the Ministry as a memorial to the late Dr. Fream, and is applied to the

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purchase of books selected by the recipient as best calculated to assist him in pursuing his agricultural studies.

Agricultural Machinery Testing Committee

THE undermentioned certificates and reports, issued by the Ministry, have been published in pamphlet form:—

No. 43.—“ Albion ” 16R. Two-Horse Mowing Machine. (Price 2*d.* net, post free, 2½*d.*)

No. 44.—“ Albion ” Expanding Horse Rake (Type A.E.3). (Price 1*d.* net, post free, 1½*d.*)

Both machines were submitted for test by the manufacturers, Messrs. Harrison, McGregor & Co. Ltd., Albion Iron Works, Leigh, Lancashire.

Copies of these pamphlets may be obtained, at the prices stated, through any bookseller, or direct from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C.2.

Register of Growers of Certified Narcissus Stocks

The Ministry of Agriculture and Fisheries announces the issue of a Register of the names and addresses of narcissus growers whose stocks have been examined in the field during the past season by the Ministry's Inspectors, and certified to be true to type and reasonably free from rogues. The Register includes particulars of the certified stocks of each of the twenty commercial varieties included in the inspection scheme and of certain other varieties.

Bulb growers who desire to secure true stocks of these varieties for planting this autumn should obtain a copy of the Register, free of cost, from the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

* * * * *

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on Tuesday, May 23, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Dorset.—(1) An Order fixing minimum and overtime rates of wages to come into operation on June 11, 1933, (i.e., the day following that on which the existing rates are due to expire), and to continue in force until June 9, 1934. The minimum rates for male workers of 21 years of age and over are 30*s.* per week of 44 hours

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in the weeks in which August Bank Holiday, Good Friday, Easter Monday and Whit Monday fall, 53½ hours in any other week in summer, 31 hours (instead of 39½ hours as formerly) in the week in which Christmas Day and Boxing Day fall, and 48 hours in any other week in winter. For female workers of 21 years of age and over (other than part-time and casual workers) the minimum rates are 24s. per week of 39½ hours in the weeks in which August Bank Holiday, Good Friday, Easter Monday and Whit Monday fall, 31 hours (instead of 39½ hours as formerly) in the week in which Christmas Day and Boxing Day fall, and 48 hours in any other week. In the case of all workers referred to above the minimum rates cover, in addition to the hours stated, not more than three hours on Good Friday, Easter Monday, Whit Monday and August Bank Holiday, Christmas Day and Boxing Day respectively, on work in connection with milking and the care of and attendance upon stock. For part-time or casual female workers of 18 years of age and over the minimum rate is 5d. per hour. The overtime rates are 8d. per hour for male workers of 21 years of age and over, and 6d. per hour for all classes of female workers of 20 years of age and over.

(2) An Order fixing special overtime rates of wages for the employment of male workers on the hay and corn harvests. The overtime rate for male workers of 21 years of age and over is 9d. (instead of 10d. as formerly) per hour.

Hampshire and Isle of Wight.—An Order fixing special rates of wages for overtime employment of male workers on the corn harvest in 1933, the overtime rate for workers of 21 years of age and over being 9d. per hour.

Hertfordshire.—An Order fixing special overtime rates of wages for employment during the hay harvest of 1933, the overtime rate for male workers of 21 years of age and over being 10d. per hour and for female workers of 19 years of age and over 7½d. per hour.

Enforcement of Minimum Rates of Wages.—During the month ending May 14, legal proceedings were taken against eight employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
Durham ...	Stockton ...	£ s. d. 1 0 0	£ s. d. —	£ s. d. 0 12 0	1
Hereford	Ledbury ...	* —	—	—	1
"	"	3 3 0	0 2 0	67 0 0	1
Lincoln : Kesteven	Scunthorpe	2 0 0	—	13 7 6	2
& Lindsey					
Nottingham	Retford ...	1 0 0	5 0 0	14 18 3	1
Somerset	Weston- super-Mare	5 0 0	0 12 6	13 0 0	1
Glamorgan	Cowbridge	2 0 0	0 6 6	9 12 4	1
Pembroke & Cardigan	Saunders- foot	2 0 0	3 5 6	11 1 0	1
		16 3 0	9 6 6	129 11 1	9

* Case dismissed.

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The Boutflour Cow-Rationing and Management Chart.—Under this title an attractive poster has been prepared by Mr. R. Boutflour, Principal, Royal Agricultural College, Cirencester, setting out in a simple and effective form the principles and practice of rationing for milk. The chart contains tables of gestation, food values and requirements, hints on clean milk production, calf-rearing, and much other information likely to be useful to those who have the care of dairy stock. It is intended for display in the cow-house or food store, and should serve admirably for this purpose. Priced at 1s., the Chart can be obtained from "The Dairy Farmer," 12, Hanover Square, London, W.1.

* * * * *

Foot-and-Mouth Disease.—Since the May issue of this JOURNAL was published, two cases of Foot-and-Mouth Disease have occurred at Stanton Fitzwarren, Wiltshire, on May 24 and May 26, respectively. The usual restrictions on the movement of animals in the district surrounding the infected premises have been imposed.

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Lancashire.—Mr. G. C. Marginson, M.R.C.V.S., has been appointed Veterinary Surgeon and Lecturer in Veterinary Hygiene, *vice* Mr. C. Blackhurst, M.R.C.V.S. (deceased).

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Insects and Diseases of Ornamental Trees and Shrubs. By E. F. Felt and W. H. Rankin. Pp. xix + 507. (New York: The Macmillan Company. London: Macmillan & Co. Ltd. 1932. Price 25s.)

As stated in their preface, the authors' purpose is to give a readable and practical summary of the problems affecting shade and ornamental trees in particular, with special reference to methods of control, and, as far as the American reader is concerned, it will doubtless fulfil this aim. The pests dealt with, at any rate, are, in the main, so different from those found in this country that the British reader must necessarily regard the book from a rather different point of view. As a guide to the nature of the measures advised for dealing with troubles of ornamental trees in America, the book has a general application, and it is also of interest as showing the kinds of pests and diseases that might be introduced with certain plants from that continent. It may therefore be commended rather to the student of such matters than to those actually engaged in dealing with ornamental trees in the British Isles. To scientific workers in entomology and in mycology the book will scarcely make a strong appeal, since the treatment is on rather broad lines and there are no references to the relevant literature. On the other hand, although the title might not suggest it, there is a useful chapter on injuries due to agencies other than organisms, such as unsuitable water relations, frost, gas, smoke and electric currents.

The Physiology of Farm Animals. By F. H. A. Marshall and E. T. Halnan. Pp. xiv + 366, and 118 Figs. (Cambridge University Press. 1932. Price 15s.)

The second edition of this book, written primarily for students of agriculture, has now appeared. The original intention of completing the work in two parts, one dealing with the general principles of physiology as applied to farm animals, and the second on animal nutrition, was abandoned, and the present volume combines the two aspects under one cover.

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It may be said at once that the book as a whole is written in clear and simple language, that it more than fulfils the requirements of a text-book on physiology for students proceeding to an ordinary degree in agriculture, and that it can be strongly recommended for all such. The older practical agriculturist who may wish to keep himself informed of the progress of animal physiology, or perhaps more particularly to possess a book to which he can refer for information concerning the more important physiological principles and processes, could not do better than purchase this book.

As was to have been expected from an author who holds a unique position in the science of animal reproduction, such as does Dr. Marshall, the sections dealing with the various aspects of this subject are more detailed and comprehensive than some others. This is entirely advantageous. Probably no other writer has provided for the agriculturist such a concise, up-to-date and clear exposition of the general principles of reproduction.

Many of the more modern and at present irreconcilable harmonic theories are wisely avoided; consequently the reader who has no clear conception of these is saved from the morass into which not a few scientists who have specialized in a study of the reproduction hormones are apparently now floundering. Established facts are given and hypotheses are either only briefly mentioned or are avoided.

If criticisms are to be made, it may be mentioned that where certain specialized structures are discussed, general principles are given correctly but certain details are not always entirely accurate. Much reference has been made to Smith's "Veterinary Physiology," and unfortunately that admirable work is in certain aspects now somewhat out of date. For example, it is not entirely accurate to describe the periople (p. 179) as a cement between skin and horn; most students will not recognize the coronary groove as the "cutigeral groove"; the plantar cushion can hardly be said to produce horn; and cold sweating in horses cannot be regarded as always of pathological origin. Tetany and tetanus are hardly synonymous terms. Where mention is made of diseased processes, and especially where diagrams are given, one gains the impression that the reader will not be much wiser after a perusal of these than before. Fig. 6r, which is intended to illustrate displacement of the third phalanx together with the normal appearance, actually shows two photographs in each of which the bone is badly displaced; it would be hard to say which of the two was the worse, for the photograph of the normal specimen shows it to be shrunken and with the third phalanx displaced. Fig. 67 shows the bones of a tarsus affected with spavin. It is, to say the least, most unusual to observe an angle between tibia and calcaneus of as much as 90° . The bones far more nearly resemble an ankylosed human ankle than a horse's hock with spavin. The photographs of splint and sidebone (Figs. 68 and 70) will certainly not convey to the novice any idea of what these two diseased processes are like. It would be unfair, however, to enumerate the several other pathological inaccuracies which have unfortunately been included in this otherwise admirable book. They will, it is feared, serve to prejudice the mind of the veterinary student against the use of the book even for purely physiological purposes.

In conclusion, it is necessary to mention particularly the high standard attained in the general format of the book, and perhaps in particular in the reproduction of the diagrams of histological structures. That several of the anatomical diagrams are somewhat old does not greatly matter, for they illustrate quite adequately the desired features.

The book is one which can be heartily recommended to all agriculturists who wish to survey the general field of animal physiology and nutrition, or who wish to possess a work to which they may refer for enlightenment on this or that specific body function.

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"The Feathered World" Year Book, 1933. (London: *The Feathered World*. Price 2s.)

The high standard associated with this annual is well maintained in the current issue, which contains over 500 pages of illustrated articles on the various breeds of poultry and pigeons, in addition to facts, figures and other matter of interest to the practical poultry-breeder. An introductory chapter by Mr. S. H. Lewer draws attention to the fifth triennial World's Poultry Congress, which will take place in Rome next September. Sir Edward Brown contributes a comprehensive survey of the progress of the industry during 1932. Other articles calling for special mention are "In My London Back-yard," in which Mr. J. Newton Williams details some remarkable results obtained in a very restricted suburban space; a chapter on "Shelters," by Mr. H. Howes, of the National Poultry Institute; and some notes on Poultry Manure by Mr. A. P. Thompson.

A Text-Book of Biochemistry. By A. T. Cameron, M.A., D.Sc., F.I.C., F.R.S.C. Third ed. Pp. xi + 548, 2 Plates and 13 Text Figs. (London: J. & A. Churchill. 1932. Price 15s.)

This book is intended primarily for students of medicine and science, but will also be of service to students of animal nutrition and veterinary science, although digestion in ruminants receives no special consideration, and plant biochemistry is omitted. An elementary knowledge of organic chemistry is assumed, and the requisite physical chemistry is introduced where necessary.

The volume is divided into sections dealing successively with physico-chemical conceptions, foodstuffs and related compounds, digestion, circulation and excreta, intermediate metabolism, quantitative metabolism, and brief addenda supplying an introduction to the chemistry of immunology, the utilization of biochemical processes in industry and a biochemical introduction to pharmacology. References to more specialized publications are given as a guide to wider reading.

The presentation of the subject-matter is clear, the essentials of modern biochemistry being set forth without unnecessary detail. The first edition appeared in 1928, and the present volume is a reprint of the third edition of 1931—a sufficient tribute to its popularity.

Recent Advances in Agricultural Plant Breeding. By H. Hunter and H. M. Leake. Introd. by Sir Rowland Biffen, F.R.S. Pp. x + 361. Illus. (London: J. & A. Churchill. 1933. Price 15s.)

Genetics, the youngest of the sciences, has only very recently been applied to crop improvement; indeed, the science itself is only just over three decades old. Its extreme youth notwithstanding, scientific plant breeding has in this short time made advances of an almost alarming magnitude. The fate of countries has been influenced by this infant of the sciences, and it is hardly an exaggeration to say that the very existence of some countries to-day is dependent on the extended agricultural possibilities resulting from the introduction of some new and specially adapted variety by a breeder.

Yet what does the agriculturist know of these new discoveries? Indeed, what can he be expected to know when the reports of them are scattered over hundreds of scientific periodicals in all parts of the world. The volume under review for the first time presents the achievements of the plant breeder in a collective form, and both the authors and those who have sponsored the publication are to be congratulated on the truly imposing body of material that has been compressed into comparatively small space.

The authors start with general remarks, giving, amongst other things, indications of the best procedure to be adopted in breeding, after which the crops are treated in turn, temperate cultures being

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followed by those of the tropical zones. The considerations that have influenced the breeder in planning and carrying out his work are discussed for every crop; high yield and resistance to some disease, pest or other damage figure largely in nearly all breeding programmes. Valuable indications are given of the pedigrees, where known, of those varieties that have played the most outstanding role in the development of a given crop, and a notable feature of the book, one moreover in which it differs from so many works of a similar nature, is the ample consideration given to important results achieved abroad and published in foreign languages.

Reference to the rather vast amount of genetical work that has been done with many economic plants, such as tobacco and maize, and that up to now is of mainly theoretical interest, has been wisely omitted. On the other hand, where investigations of a more recondite nature have led to the solution of some problem of practical breeding, as has so often been the case with cytological studies, inclusion of them has not been shirked. In certain instances the value of the book has been further enhanced by the inclusion of original or unpublished material not otherwise available to the reader.

One of the main uses of the book will probably be the opportunity it affords to breeders of one crop to make themselves familiar with the work done in others. Many readers will probably be astonished at the volume and extreme interest of much of the recent work on the tropical and sub-tropical plants. The book makes no attempt to take the place of an elementary textbook, but no agriculturist can afford to overlook such a work, and even students of genetics will hardly fail to appreciate the wide significance of many of the phenomena that have been brought to light under the name "plant breeding."

The book is not without errors and omissions—no work of such a nature can be—and many of the statements it contains have been modified by later work: in a rapidly moving subject up-to-dateness is a merely relative term, and any summing-up is bound to be out of date before it appears. The book is a milestone in plant breeding and is a worthy addition to the series of "Recent Advances."

Manual of Agricultural Chemistry. By H. Ingle, B.Sc. 5th ed. Pp. ix + 448. 16 illustrations. (London: Ernest Benn Ltd. 1933. Price 15s.)

This textbook has been a friend to many agricultural students since the publication of the first edition in the early years of the present century. It was in every sense a pioneer volume, appearing at a time when the importance of agricultural education was beginning to be realized, and when the lack of a textbook dealing with the scientific aspects of agriculture was being felt acutely by teacher and student alike. It was distinguished by its lucidity and comprehensiveness, and made an immediate appeal, particularly to students preparing for agricultural degrees and diplomas. Its sale during the last thirty years has been steady, and evidence of its popularity is afforded by the fact that, during this period, no fewer than four editions have been published. The numerous admirers of the work will welcome the appearance of this fifth revised and enlarged edition, and although, at the present time, the student has a fairly wide choice of textbooks devoted to the study of the scientific foundations of agriculture, it is safe to predict that Mr. Ingle's book will continue to maintain its popularity.

In this new edition, the author has reproduced the fourth edition together with a supplement containing a short account of recent advances in chemical discovery which have a bearing on agriculture. An attempt is made to bring the subject of vitamins up to date, but so quickly does knowledge increase in this domain of biochemistry that the necessary delay between writing and publishing is quite sufficient to render any account of the vitamins incomplete and un-

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satisfactory. Among other subjects, the supplement deals with new views about the constitution of the earth and its atmosphere; the functions of certain elements (e.g., copper, iodine, etc.) in the metabolism of plants or animals; the production of synthetic nitrogenous compounds; and modern views respecting the mechanism whereby the muscle fibres derive their energy.

The general character of Mr. Ingle's book is too well known to need detailed description. It is in reality a condensation of several textbooks, serving as an introduction to physiological chemistry, plant biochemistry, soil chemistry and physics, chemistry of fertilizers, dairy science, the science of foods and feeding, and the chemistry of insecticides and fungicides. If, possibly, it seeks to do more than can legitimately be accomplished within the scope of a single volume, it must nevertheless be confessed that the author reveals the detailed knowledge of the expert in all the different branches of the subject with which he deals. Despite revision, however, statements occur here and there that appear to "date" the treatise, as, for example, on p. 307, where, in referring to earth-nut cake, the author makes the following comment, which must seem unaccountable to readers unacquainted with pre-war conditions:—"This is a valuable food, largely employed on the Continent, though little used in England and America." Such criticisms are only minor points, however, and no agricultural student should be without this excellent textbook.

Strawberry Roan. By A. G. Street. Pp. 328. (London: Faber & Faber Ltd. 1932. Price 7s. 6d.)

This is a book that one may well read with mixed feelings. To an agriculturist the farming aspect, the love of the land, the charm of the countryside, the glory of doing things, the portrayal of characters—are altogether delightful. The farmers and their men—as well as their wives—are living beings, redolent of the soil, of crops and stock. As one learnt from his earlier book, "Farmer's Glory," Mr. Street graduated in a hard school of farming, but he has keen observation and a well-stored memory, and his books indicate clearly that he knows what he is talking about. As a novel, "Strawberry Roan" leaves one a trifle unsatisfied, though one's imagination suggests that Chris is on the way to find peace and content with a second wife whose estate he will run to perfection. The story, however, deals with the movements of Wold Dolly's strawberry roan calf, sold in a market at a few days old, grown on with a bunch of others on the new farm, bought by a delightful dealer to go to a third home, sold to a fourth farmer through the tragedy of Chris' sale, well mated, and finally—and very satisfactorily—bought to increase the milking herd of her first owner. The difficulties of farming in the post-war years; the unfortunate forgetfulness of many that the wave of prosperity and high prices could not be expected to continue indefinitely; the steady fall in prices and consequent vanishing of profits; the laying down of land to grass and the development of dairying—all these matters are strongly brought out by Mr. Street through the mouths of his farmer characters. From this point of view, farmer-readers will do well to peruse this delightful book—which the reviewer confesses he wished to finish at a sitting. One is left, nevertheless, with the feeling that Mr. Street might have produced an even finer book if he had omitted some of the rather sensuous setting in the life of Chris and his ill-fated young wife.

Recent Developments in Market Gardening. *Conference Report* No. XV. Pp. 48. (Obtainable from the Secretary, Rothamsted Experimental Station, Harpenden, Herts. Price 2s.)

This report of a recent Conference held at Rothamsted contains much information that is not readily available in a collected form.

SELECTED CONTENTS OF PERIODICALS

There is a concise account of the fruits and vegetables required for canning, including an estimate of quantities for the current year. Detailed descriptions of the market garden areas of Bedfordshire and Worcestershire are contributed by their respective County Agricultural Organizers. The report shows that many large-scale farmers have substituted vegetable growing for less profitable crops of ordinary rotation, and traces the influence of this development on the market gardening industry. The consequent rapid increase in vegetable supplies is creating economic difficulties, and it is fortunate that methods of preservation and canning are receiving attention, since they offer alternative means of marketing. The concluding pages are devoted to a report of a discussion in which a number of practical men took part, and stated their views on growing, canning, and other matters affecting the industry.

SELECTED CONTENTS OF PERIODICALS

Agriculture, General and Miscellaneous

The National Organisation of Agriculture. *M. Fordham*. (Jour. Bath and W. and S. Counties Soc., Sixth Ser., 7 (1932-1933), pp. 10-22.) [338.1 (42).]

Agriculture and the National Financial Crisis. More Intensive Methods with Increasing Population. *A. G. Ruston*. (Jour. Land Agents' Soc., 32, 3 (March, 1933), pp. 150-167.) [338.1 (42).]

Notable Farming Enterprises: III. I. Mr. Webster Cory's Farms. II. Messrs. S. E. and J. F. Alley's Mechanised Farming. *H. G. Robinson*. (Jour. Roy. Agric. Soc. England, 93 (1932), pp. 146-165.) [63.191.]

Derbyshire Farming, Past and Present. *J. R. Bond*. (Jour. Roy. Agric. Soc. England, 93 (1932), pp. 165-189.) [63 (42).]

The Relative Productivity of Scottish, English and Danish Agricultural Land. *H. G. Müller*. (Scottish Jour. Agric., 16, 2 (April, 1933), pp. 172-184.) [31 (41); 31 (42); 31 (489).]

The Weed Seed Population of Arable Soil: II. The Influence of Crop, Soil and Methods of Cultivation upon the Relative Abundance of Viable Seeds. *Winifred E. Brenchley* and *Katherine Warington*. (Jour. Ecol., 21, 1 (Feb., 1933), pp. 103-127.) [63.259.]

Peat Mosses: II. The Draining of Peat Land. *I. M. Robertson*. (Scottish Jour. Agric., 16, 2 (April, 1933), pp. 160-172.) [63.12.]

The Relation of Soils to Grain-growing in Kent in the Thirteenth Century. *R. A. Pelham*. (Emp. Jour. Exp. Agric., 1, 1 (April, 1933), pp. 82-84.) [63 (09).]

Young Farmers' Clubs. *J. A. S. Watson*. (Scottish Jour. Agric., 16, 2 (April, 1933), pp. 138-144.) [374.]

The Organisation of Training and Research in Animal Husbandry in Various Countries. (Int. Rev. Agric. (Mon. Bull. Agric. Sci. and Pract.), 24, 2 (Feb., 1933), pp. 66-75.) [37.619.]

Agricultural Machinery

The Calculation of the Annual Cost of Farm Machinery and Implements. *J. Wyllie*. (Jour. Roy. Agric. Soc. England, 93 (1932), pp. 25-67.) [338.58; 63.17.]

The Development of Haymaking Machinery. *W. H. Cashmore* and *J. E. Newman*. (Emp. Jour. Exp. Agric., 1, 1 (April, 1933), pp. 58-67, pl. 7 and 8.) [63.17.]

SELECTED CONTENTS OF PERIODICALS

Electricity in Mechanised Farming. *H. J. Denham.* (Scottish Jour. Agric., 16, 2 (April, 1933), pp. 144-152.) [63.17.]

Farm Buildings

The Repair and Reconstruction of Farm Buildings. (Jour. Land Agents' Soc., 32, 4 (April, 1933), pp. 224-228.) [69.]

The Construction and Equipment of Cattle Byres: I. Byre Flooring. *A. B. Fowler.* (Scottish Jour. Agric., 16, 2 (April, 1933), pp. 191-196.) [63.6; 69.]

Soils

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THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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NOTES FOR THE MONTH

Young Farmers' Clubs: An Appeal

THE Young Farmers' Clubs movement has been referred to many times in this JOURNAL because it is regarded as of great potential value in inculcating a practical interest in agriculture. For those unacquainted with the movement, its aim may be briefly stated. This is to form clubs of young people of both sexes who will work together, on profit-making lines, in the business of keeping calves, pigs, poultry, rabbits or bees, or in the growing of garden produce, or in developing some other branch of agriculture or horticulture. Each member of a Club engages in business in his or her chosen branch, keeping account of costs and expenditure, and setting off against them the returns from sales. There are club meetings, club leaders, and county and national meetings of club representatives. These things help to cultivate business methods and habits, but even more valuable, in these associations of young and growing persons, is the concurrent and gradual moulding of character, which instils an appreciation of the value of thoroughness and integrity in the affairs of life. Thus, the movement should influence for good the next generation of farmers in the important work upon which they will be engaged. Clubs have now been established in more than 170 centres, and the central body, the National Federation of Young Farmers' Clubs, will not be content until there is a club in every suitable village. In this ambition, the Federation has the approval of H.R.H. the Prince of Wales, who, speaking at Nottingham last year, said: "If you think a Young Farmers' Club would be useful in the village, don't go on talking about it, but start it."

The Ministry, as is well known, has assisted and encouraged the movement for over ten years, and very substantial help has also been given by the Carnegie United Kingdom Trustees. Unfortunately, for reasons entirely unconnected with the merits and requirements of the move-

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ment, assistance from these two sources cannot be expected after the expiry of the present year. It has become necessary, therefore, to make a wide appeal for funds for maintaining and developing, as a national object, the Young Farmers' Club movement throughout the Kingdom. This Appeal has been launched with the support of the Prince of Wales, the Minister of Agriculture and Fisheries, and many other leaders and pioneers in rural interests. It is supported also by other members of the Government who, in their particular Departments, have had opportunities of judging the character and value of the work that the Clubs are doing. The President of the Board of Education, Lord Irwin, says:—

I warmly commend the Appeal being made by the National Federation of Young Farmers' Clubs. In some cases, the Clubs have been formed, where conditions permitted, in conjunction with schools; and, in such circumstances, the Clubs give a breadth and additional reality which are most stimulating to the ordinary work. I am sure that, apart from its work in connexion with all matters of direct interest to agriculture, the movement affords valuable means of bringing its members, who are the next generation of farmers, into touch with one another and so trains them in the habit of co-operation, which is more and more going to be the essential foundation of their industry. For these reasons, the firm establishment and extension of the Federation are objects deserving of all support.

The Minister of Health, Sir E. Hilton Young, has also written supporting the Appeal in the following terms:—

I gladly support the Appeal which the National Federation of Young Farmers' Clubs is making. I know what admirable work the Federation is doing to start and support Young Farmers' Clubs in country areas. I am convinced of the great value to the Nation of this movement, and I hope that the Appeal which is now being made will be widely supported.

In these circumstances, it is the business of everyone who has the welfare of the countryside at heart to do what is possible to assist the Federation in its task. The object has been so generally approved in the past that it is hoped, now that a rally of well-wishers is called for, that there will be no lack of general support, or any fear of failure for want of funds. In the movement itself, there are no shortcomings either of enthusiasm or guidance. The Committee and Officers of the National Federation are able and energetic. Through their efforts, the total number of Clubs was very nearly doubled during the past year; is it too much to hope that they will be enabled to double the number again by 1934?

It is estimated that an amount of £25,000 is required to place the National Federation on a permanent basis. There

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is, therefore, opportunity for all to assist in this excellent work, and no one need be deterred from sending by thinking that the contribution they can make is too insignificant to send. Contributions should be addressed to the National Federation of Young Farmers' Clubs, 16, Russell Square, London, W.C.1.

Home-grown Barley for Poultry Feeding

At the present time, when greater attention is being given to the use of home-produced commodities, the experimental work that has been carried out at the Norfolk Agricultural Station will be of interest to farmers who keep poultry. The object of these experiments was to discover whether it was possible to compound from home-grown cereals a poultry ration that would be advantageous for egg production.

For the purposes of the test four pens of pullets were employed, two of Rhode Island Reds and two of White Leghorns. One pen of each breed was fed on a ration that was regarded as typical, the mash consisting (by weight) of 2 parts bran, 4 parts supers, 2 parts maize meal and 1 part Sussex ground oats, with fish meal added; the grain feed consisted of wheat and maize. The only imported products in this ration were the maize and maize meal and, as a substitute for these, home-grown barley and barley meal were used in the other two pens, this being the only difference in the feeding systems. The investigation was continued over two years, fresh pullets of the same breeds being used in the second year. The figures given below therefore relate to two years of pullet production.

	<i>Rhode Island Reds.</i>		<i>White Leghorns.</i>	
	1st year.	2nd year.	1st year.	2nd year.
	Eggs per bird.		Eggs per bird.	
Maize fed ..	176.8	163.2	171.6	185.1
Barley fed ..	192.4	163.2	161.2	179.9
Difference:—				
Barley ..	+ 15.6		Maize + 10.4	+ 5.2

The combined averages of the two breeds over two years were as follows:—

Maize fed ...	...	174.7	eggs per bird.
Barley fed ...	...	176.8	„ „ „
Difference, Barley		+2.1	„ „ „

It can be accepted from these figures that barley and barley meal may replace maize and maize meal in a ration. Tests carried out at the National Institute of Poultry

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Husbandry have also shown that, provided barley is used in a balanced ration, it is as valuable a feeding stuff as any other cereal. As barley contains a high percentage of fibre, it is desirable to grind finely when converting to barley meal.

The only disadvantage in the use of barley is that it tends to give rise to pale yellow-coloured yolks.

It will be readily understood, of course, that barley can only be advantageously used in this way by the general farmer who has either a quantity of barley surplus to market requirements, or whose grain is unsuitable for malting. For the specialist poultry farmer who has to rely largely or entirely on purchased foodstuffs, the use of barley in preference to maize would obviously be an uneconomic proposition.

Destructive Insects and Pests and the Importation of Plants

AN Order has been made by the Ministry of Agriculture and Fisheries under the Destructive Insects and Pests Acts, 1877 to 1927, amending and consolidating the existing regulations affecting the importation of plants, &c., into England and Wales.

The new Order, which is entitled *The Importation of Plants Order of 1933* and comes into operation on July 15, 1933, requires all imported consignments of living plants and parts thereof (except seeds) for planting, and all potatoes, to have been officially examined by the authorities of the country in which they were grown, and certified as healthy and free from any evidence of the presence of any insect, fungus or pest destructive to agricultural or horticultural crops. This requirement is not limited, as in the previous regulations, to plants "with a persistent woody stem above ground," but applies to all classes of living plants. An additional certificate is required, as hitherto, in respect of plants grown in France, to the effect that the Colorado Beetle has not been known to exist within 200 kilometres of the place where the plants, etc., were grown.

Consignments that arrive unaccompanied by the prescribed certificates of health, and that were formerly allowed to proceed to their destination, will now be detained by the officers of H.M. Customs and Excise, and will have to be destroyed or re-exported at the expense of the importer

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unless a licence is issued authorizing the plants, etc., to be disposed of otherwise. If this licence is granted it may require the consignment to be examined by one of the Ministry's Inspectors when, if the plants, etc., are found to be healthy, a certificate authorizing their release will be issued after payment by the importer of the fee prescribed for this service.

The existing prohibition of the importation of potatoes grown in the United States of America, the Dominion of Canada, or in France, remains in force; the transshipment of such potatoes in English or Welsh ports is also prohibited, except under licence from the Ministry. The health certificate for potatoes from other countries, which was specified under the previous regulations, required an additional statement to the effect that no case of Wart Disease had occurred within five hundred yards of the place where the potatoes were grown; in the new Order this distance has been extended to two kilometres (approximately $1\frac{1}{4}$ miles).

An additional provision of the new Order relates to cider apples imported between March 15 and October 14 in each year. Between these dates cider apples grown in France must be accompanied by an official certificate in similar terms to that required during the same period in respect of raw vegetables grown in France, i.e., to the effect that the Colorado Beetle has not been known to exist within a radius of at least two hundred kilometres of the place where the produce was grown. Cider apples and raw vegetables grown in any other European country and imported between the above-mentioned dates must be accompanied by an official certificate of origin.

The new Order continues the restrictions that were first imposed in 1930 on the importation of raw apples grown in the United States of America, and between July 7 and November 15 in every year these may be imported only when accompanied by an official certificate to the effect that they are of one or other of the two highest grades recognized by the Federal Department of Agriculture.

Any imported plants, potatoes, raw apples or raw vegetables found to be unhealthy must be treated, destroyed or re-exported at the expense of the importer.

One of the Orders now revoked (the Destructive Insects and Pests Order of 1922), enabled certain measures to be adopted in the event of the appearance of certain

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scheduled pests in England or Wales, and prohibited the sale of such pests. These regulations have now been amended in certain particulars and made the subject of a separate Order entitled *The Destructive Insects and Pests Order of 1933*.

This Order, which also comes into operation on July 15, 1933, prohibits the keeping, sale or release in any stage of its existence of any insect of a non-indigenous species except under licence from the Ministry. "Insect" includes bacteria and other vegetable or animal organisms and any agent causative of a transmissible crop disease; "a non-indigenous species" means a species or kind that is destructive to agricultural or horticultural crops, or to trees or bushes, and that, at the date of the commencement of the Order, was not established in Great Britain.

Inspectors of the Ministry have power to enter any premises on which they may have reason to believe that any such insect is kept or that there are any plants attacked by any such insect, and may serve notices requiring measures to be adopted for prevention of the spread of any such insect.

Copies of both Orders may be obtained from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, or through any bookseller; the price of the Importation of Plants Order of 1933 is 2*d.* net and of the Destructive Insects and Pests Order of 1933 1*d.* net.

Leverhulme Research Fellowships

UNDER the will of the late Lord Leverhulme the income from a part of his estate will be devoted to the granting of scholarships for "research and education." The Trustees of the will recently made grants for this purpose to several institutions, and have decided to devote the sum of £12,000 a year to the establishment of a scheme of research Fellowships. These Fellowships are intended in the first instance for the assistance of experienced workers rather than to add to the provision already existing for workers in the early stages of their careers. The Trustees have in mind particularly men and women who are prevented either by pressure of routine duties or by any other cause from undertaking, or completing, an investigation of value. They have decided, therefore, to place no definite limit to the amount of individual grants, which will be

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adjusted according to the circumstances of each particular case. The duration of grants will normally not exceed two years. Fellows will usually be required to work at or in connexion with a recognized centre of research, either at home or abroad. No subject of inquiry is excluded from the scope of the scheme; but under present conditions, it is intended that preferential consideration shall be given to subjects in which the existing provision is inadequate.

The following gentlemen have accepted an invitation to serve on an Advisory Committee for the selection of Fellows, and for the general supervision of the scheme:—Dr. H. J. W. Hetherington (Chairman); Professor A. M. Carr-Saunders, Sir William Hardy, F.R.S., Dr. N. V. Sidgwick, F.R.S., and Mr. H. T. Tizard, C.B., F.R.S. Dr. L. Haden Guest has been appointed Secretary.

Applications (from British-born candidates normally resident in the United Kingdom) and all inquiries and communications in connexion with the scheme should be addressed to the Secretary (Leverhulme Fellowship Scheme, Union House, St. Martin's-le-Grand, London, E.C.1), who will furnish further information and a schedule of the particulars required.

The Advisory Committee will meet early in July to consider recommendations for the first awards under this scheme. They will then be able to deal with applications received up to June 19. Later applications will be considered at a later date.

World's Poultry Congress, 1933

IN connexion with the World's Poultry Congress to be held in Rome next September, arrangements have been made by the *Daily Mail* for the publication of a brochure on British breeds of poultry, which should serve as a useful and reliable guide to the subject. The work, which is being edited by Messrs. P. W. D. Izzard and J. N. Leigh, will be printed in English, Italian and German, and profusely illustrated with half-tone and colour blocks. Names and addresses of exhibitors selected to send birds to the British live stock display at the Congress Exhibition will be inserted, free of charge. Appropriate black-and-white illustrations of representative birds belonging to British exhibitors will also be included in the text, at reduced advertisement rates, and under them will be

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printed exhibitors' names and addresses, with notes on the birds' successes (if any) at laying trials and shows. With regard to breed varieties not illustrated by exhibitors' letterpress block advertisements, this privilege will be extended as far as possible to breeders who have subscribed to the general fund of the British Committee. The brochure will be distributed gratis at the Congress.

Entries have now been received for the live stock to be included in the British exhibit. As the Congress Exhibition affords a splendid opportunity to demonstrate the value of British poultry, extreme care is being taken that only stock of the highest quality shall be accepted. The technical and secretarial services required in connexion with staging the national exhibit are being provided free of cost, and no Government grant is available for this purpose. To meet necessary expenses the British Committee is therefore making an appeal for £1,000, all of which amount will be used for securing adequate British representation at the Exhibition. Donations towards this object will be gratefully received by Mr. W. E. Walters, British Secretary to the Congress, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Imperial Fruit Show and Cannery Exhibition, 1933

THE Imperial Fruit Show and Cannery Exhibition will be held this year in the Coliseum, Bristol, from October 27 to November 4. The Coliseum is situated in Park Row, near the University of Bristol, and is conveniently reached from all parts of the city. Originally built as a skating rink, and until recently used as an aircraft factory, the entire building is now being reconstructed and redecorated, and the Imperial Fruit Show will be the first exhibition held there since the war. Approximately 40,000 square feet of floor space will be available for growers and cannery, and other trade exhibits. Large areas are being set aside for a combined display by Empire countries and for a canning section, in which a number of leading cannery and manufacturers of canning machinery and appliances will take part. The Show programme will include conferences for growers, a Canning Convention, and probably visits to the research stations under the control of the University of Bristol. Steps are now being taken to organize a local Advisory Committee, with members drawn from all Bristol organizations directly interested in the Show.

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Inspection of Growing Crops of Potatoes

THE Ministry is now making arrangements for the inspection of this season's potato crops for the purpose of granting Purity Certificates for stocks that are found to be true to type and reasonably free from rogues. All growers in England and Wales who intend to sell seed potatoes are invited to apply for these Purity Certificates. The necessary examination must be made while the crops are in full growth, and growers of early varieties should therefore send in their applications without delay. Growers of late varieties should apply before July 31, so that inspection can be made before the crops have died down.

A fee of 2s. 6d. per acre or part of an acre is charged for inspection. Forms of application may be obtained from the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Farm Institute Live-Stock Judging Competition

THIS live-stock judging competition—the seventh of a series of annual competitions open to students from county farm institutes in England and Wales—was held on June 1 at the farm of Mr. Milton Harris, Little Milton Manor, near Oxford. Mr. Milton Harris is one of the best-known stock farmers in Oxfordshire, and the thanks of the organizers are due to him for the excellent arrangements he made for the success of the competition.

Teams of students were entered from the following counties:—

Hertfordshire (Oaklands),
Monmouthshire (Usk),
Northamptonshire (Moulton),
Staffordshire (Rodbaston),
Suffolk (Chadacre).

The Oaklands team, which was last successful in 1931, proved to be the winners with a score of 261 marks out of 365, and was followed by the Staffordshire team with 247 marks.

At this year's competition, Mr. Milton Harris had provided very good classes of stock which were difficult to judge. It was emphasized that the determining factor was to be utility rather than breed points, and consequently the competition proved a valuable object lesson, not only to the students but to all the company round the ring.

Mr. B. J. Gates, the President of the National Farmers' Union (under whose auspices the competition is held), pre-

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sented the cup to the winning team, and referred in his address to the disappointingly small entry. These competitions are of considerable practical value to young people who are studying agriculture, and they deserve better support. No doubt the need for economy has weighed with the counties that were not represented. If the competition is to continue, however, it is essential that more institutes should participate, and it is hoped that local authorities who possess farm institutes will bear this in mind, and will make every effort to enter a team for next year's competition. If the entries from farm institutes are insufficient, it may be necessary to consider widening the scope of the competition so as to include teams from other educational centres.

The Jones-Bateman Cup for Research in Fruit-growing

A VALUABLE silver-gilt replica of the Warwick Vase was presented, in 1920, to the Royal Horticultural Society by Miss L. Jones-Bateman, of Cae Glass, Abergele, to be used for the encouragement of fruit production. The Cup, which is offered triennially for meritorious research work in the growing (either in the open or under glass) of hardy fruits, figs, grapes and peaches, is again available for award in the present year (1933).

Candidates desiring to compete are required to submit to the Royal Horticultural Society, by October 31 next, a detailed statement of their research work, which must have been carried out mainly in the United Kingdom during the last five years. The statements received will be considered by three Assessors, two of whom will be appointed by the Society and one by the National Farmers' Union, and they will report to the Council of the Royal Horticultural Society upon the originality, and comparative potential value to the fruit-growing industry, of the work of the respective candidates. The Council of the Society will award or withhold the Cup at its discretion.

The successful candidate will hold the Cup for a term of three years, giving a bond for its safe return, and, on relinquishing possession, will receive a commemorative gold medal. A holder is eligible to compete for the next or any subsequent award of the Cup. All communications respecting the award should be addressed to the Secretary of the Royal Horticultural Society, Vincent Square, Westminster, S.W.1.

SMALL HOLDINGS ROUND A CENTRAL FARM

LORD PHILLIMORE.

It will be agreed that the two main difficulties that face the small-holder are:—

- (1) the heavy capitalization per acre required (except perhaps in the case of statutory holdings when the holder pays a full, fair rent and not a rent based on the capital cost of the holding);
- (2) the marketing of what at the best must be a small output.

Both these difficulties are met by the Metayer system, of which the essence is that the landlord finds all the capital, the tenant all the labour, and the proceeds are divided between the two. The Metayer system has stood the test of time, probably because it meets the difficulties commonly experienced. I would add that in my experience the type of man who makes the best small-holder is he who starts without much capital. So far, the British landlord and tenant system, as developed during the last 150 years, has not proved conducive to the promotion or even the continuance of small-holdings.

It may be of interest if I give an account of an experiment in Oxfordshire on the lines of the Metayer system, but adapted to British conditions and ideas.

Gravel farm covers 133 acres and lies next to the home farm, where an active farming policy is carried on. In the neighbouring town, the home farm runs a milk-round, dealing in high-quality milk, and worked by two light motor vans. The home farm is well equipped with implements, and rejoices in a well-established and considerable herd of pedigree cattle, with plenty of young stock coming on.

Gravel farm was surrendered by its former tenant at Lady Day, 1931. It then consisted of 73 acres arable and 60 acres under permanent grass and lucerne; it was equipped with a fair-sized farmhouse, two cottages and a good set of buildings.

At the home farm, S. Holder and his son were in charge of a herd of 22 milking cows. S. Holder seemed the right type of man to make a good small-holder, but he had less than £5 put by. In these circumstances, the landlord let off the farmhouse as a private residence; absorbed into the home farm the 73 acres of arable; retained one cottage,

SMALL HOLDINGS ROUND A CENTRAL FARM

the granary, the implement shed and barns to go with the arable; and with the rent thus lightened was able to let to S. Holder the second cottage with the cowsheds and the 60 acres of grass and lucerne, at £1 per acre.

The customary year-to-year lease was executed, and at the same time a somewhat novel agreement, of which the following are the principal features:—

I. As to Cattle

(a) The landlord hired out to the tenant 21 milking cows and heifers, drawn from his own stock, at £10 per cow per year for three years, and, if the tenant elected to keep any animal for more than three years, at £5 for every subsequent year; also a bull at £20 per year. In the event of the death of an animal, the landlord has to replace it; but if the death occurs during the first three years of any animal's hiring, the tenant pays a sum equal to one year's additional hire.

(b) The tenant is not allowed to keep on the farm any cattle not supplied by the landlord.

(c) The landlord takes over all heifer calves at £6 when reared to 3 months, and disposes of all bull calves for the tenant's account, but reserves for himself any bull calf that he may wish to retain.

II. As to Milk

All milk is taken over by the landlord, at the farm, at a price that allows the landlord a full distributing margin. The milk is credited to the tenant, and out of the milk and calves the rent, hire, foodstuffs and all other expenses are paid.

III. As to Services provided by the Landlord

The Landlord:

- (a) Supplies straw in return for the dung.
- (b) Supplies oat chaff at an agreed price.
- (c) Provides three acres of roots at a price per acre—the tenant doing his own hand-hoeing and singling.
- (d) Harrows and rolls the tenant's pasture and makes his hay at an agreed price per acre.
- (e) Supplies any horse labour, carting, etc., for which the tenant may ask, at an agreed price.
- (f) Keeps the accounts and has them available for the tenant's inspection. (All milk is signed for on duplicate dockets.)

SMALL HOLDINGS ROUND A CENTRAL FARM

GRAVEL FARM.

Dr.

OCTOBER 1, 1931, TO SEPTEMBER 30, 1932, INCLUSIVE.

Cr.

	£	s.	d.	£	s.	d.	£	s.	d.	10,158 gal. milk at 1s. 6d. winter and summer	1s.	3d.	£	s.	d.
Hire of 1 bull at £20 p.a. for 10 months only	16	13	4	199	11	4	689	7	1	..	..	..	21	3	2
Hire of 17 cows for full year at £10	170	0	0				21	3	2	..	..	..	42	0	0
" 4 " " part " " "	12	18	0				8	7	9	..	..	..	35	0	0
Rent	60	0	0				18	12	2	..	..	..
Rates	2	11	3							..	..	..
Water rate	13	7	0							..	..	..
Recording Society's levy, half charged to Central Farm	1	18	9							..	..	..
Veterinary Surgeon, including tuberculosis test				77	17	0				..	..	..
Coal for sterilizing plant				8	0	0				..	..	..
Small items of dairy equipment	6	9	6	15	12	5				..	..	..
Drinking bowls installed	14	4	0							..	..	..
Purchased foodstuffs, including rick of hay				20	13	6				..	..	..
Labour and horse hire supplied by Central Farm				198	12	4				..	..	..
Cash advanced on account at £4 per week				21	0	10				..	..	..
Total debits				208	0	0				..	..	..
Balance being profit				749	7	5				..	..	..
				65	2	9				..	..	..
				£814	10	2				..	..	..

£814 10 2

SMALL HOLDINGS ROUND A CENTRAL FARM

(g) Buys foodstuffs, etc., for the tenant's account (giving him the advantage of bulk purchase).

IV. As to Cash

The landlord advances £4 per week on account of milk supplied (for tenant and son).

No other cash passes until the end of the year, when an account is taken and the tenant is paid any profit due to him, or if there is a loss and the tenant cannot then pay, it is carried forward to the next account.

A Year's Work.—The first year's accounts are given on page 305. They are so simple that it is only necessary to point out that besides the £219 10s. 7d. actually paid to the tenant (cash advances £208, plus cash balance at the end of the year, £11 10s. 7d.) he has acquired and paid for, during the year, dairy equipment valued, after allowing for depreciation, at £18 12s. 2d., and had on hand a rick of his own hay worth £35.

It may be added that so far this year he seems to be doing rather better.

The tenant, from his point of view:—

Has been paid something more than his previous wages;

Has acquired some capital;

Has his foot on the ladder;

Has a simple uncomplicated job well within his powers, and suited to his family; and

Has the opportunity to add to his earnings by keeping pigs, chickens, etc., in favourable circumstances.

From the landlord's point of view, he has himself secured:—

A fair rent;

A fair price for his cattle;

A good distributor's margin; and

His capital remains intact.

There would seem to be no sort of reason why the same system should not work where milk is sold wholesale, but in that case the landlord could charge only for delivering milk to the station.

The system would perhaps also apply to any other specialist branch of farming, provided that the landlord had or could find a market, and that it married well enough with the policy of the home farm.

This year an attempt is being made to set up an intensive poultry holding on the same lines.

MY EXPERIENCES AS A FRUIT GROWER

A. G. HARRINGTON.

As my previous occupation had nothing to do with horticulture, friends have often asked me how I came to take up fruit growing and achieve some measure of success in it. Some account of my experiences may, therefore, be of interest to others who, though similarly placed, rather hesitate to take the initial plunge.

The orchard I possess was planted with great care and thought, and well looked after in its infancy, but when it reached maturity and gave promise of a remunerative return, the planter died, and the place passed into the hands of two men who, as far as I can gather, did not know how to run a fruit plantation. Their only interest was to gather and market the fruit: the pruning and spraying of the trees were entirely neglected. It was not the paying proposition they had hoped for and, unable to carry on after five or six years, they sold it to me, I being then home from the East on leave, and due, three months later, to return for a last spell of four years' duty before retiring.

The great attraction of the orchard for me lay in its situation, not too far from London, and in the vicinity of big schools for girls and boys to which my children could be sent, while I had a relative, living nearby, who could look after the property in my absence. An orchard of medium size to look after had always seemed to me likely to furnish the congenial occupation without which, when I retired, I felt that I should stagnate. Thus, I became the proud possessor of about five acres of orchard, planted chiefly with apples but with a few plum and greengage trees in addition. That they were *bush* trees conveyed very little to me then, but, since working on them, I have been very thankful that they were not *standards*. To the condition of the orchard, I gave but little attention, especially as it was bought in the winter. I was told that it contained five varieties of apples—Worcester Pearmain (by far the most numerous), James Grieve, Cox's Orange Pippin, Bramley's Seedling and Lane's Prince Albert. Except that I had heard of Cox's, the names conveyed nothing to me, nor was I any wiser after a cursory examination of the orchard, so that the extent of my knowledge of the subject can easily be gauged.

Feeling very happy over my purchase, I returned to

EXPERIENCES OF A FRUIT GROWER

the Tropics with pleasurable anticipations of the time when the orchard would come under my personal supervision. The first shock came with the arrival of a letter stating that as the orchard looked so "moth-eaten" in early summer, an expert had been called in, and had announced that the trees were suffering from a large number of diseases and pests, and had been so badly neglected that, in all probability, they would never pull round. He recommended that the ground should be dug up in a circle round each tree, that the trees should be pruned and that they should be sprayed at least once a year with a winter wash. With rather chastened feelings, I approved the necessary expenditure in connexion with these operations, which were duly carried out during my four years' absence. The trees produced practically no fruit during the first two years; in the third year, a very good crop was sold on the trees; and, in the fourth year, my relative marketed the crop with quite satisfactory results.

During my last two years abroad. I carefully studied the subject of fruit growing from books, Government publications and a weekly journal, and returned home in June, 1928, with the certain conviction that, if the orchard was to pay, a good deal of work would be required.

The first few days on the ground were productive of varying emotions. I was pleased with the general appearance of the trees and the large number of fruitlets that had formed. Further visits showed, however, that quantities of these fruitlets were dropping and that many of those on the trees were badly holed or marked. Large numbers of caterpillars were feeding on the leaves, and many other leaves had been curled up by aphids. The conditions were evidently not going to improve, so the expert was again called in consultation.

I have always found in fruit growing that everyone connected with it is very willing to give advice and the benefit of their experience. Even men, whose names are widely known in the industry, when met at shows, or if they pay one a visit, will take extraordinary pains to instruct a novice to become their competitor. The expert called in was no exception to the rule, and he gave me excellent advice. First and foremost, there must be a proper spraying programme and it must actually be carried out. This, if nothing else, *had* to be done. Then the trees were to be pruned so that the sun and air could get in. The

EXPERIENCES OF A FRUIT GROWER

centre of each tree should be cleared to make it like a cup and all interlacing branches were to be cut out. I was also told to cultivate round each tree and not to allow weeds and grass to grow right up to the stem.

In that first year, it was not possible to do much spraying, and the trees received only one application of lime-sulphur and lead-arsenate. From this initial effort, however, it was evident that, if spraying was to be done five times a year, something definitely quicker and more efficient was needed than the knapsack sprayer I had been using. A poor crop was harvested and I realized that, if things went on in the same way year after year, the orchard would be a distinct liability. Some of the methods adopted to bring it into the category of a paying proposition may now be related.

Spraying.—This is placed first, my experience being that, if spraying is neglected or only partially carried out, all efforts in other directions are nullified. Investing in a hand-power machine, giving a good pressure, I mapped out a programme with advice from the expert and from what I could gather from books. This programme comprised a 10 per cent. winter wash in February, a lime-sulphur and lead-arsenate mist in the pink-bud stage, followed quickly, before the buds opened, by a wash of nicotine and soft soap. This was followed, a few days after petal-drop, by a nicotine wash of the same strength and then a 1 per cent. application of lime-sulphur and lead-arsenate.

I realized, before starting, that the full benefits of efficient spraying would take time to accrue and that probably two years would pass before the results became apparent. This was as well, because the first spraying programme was followed by a small crop that seemed to be as badly attacked by pests as before. It required some courage to embark on a full-spraying programme in the following year, but this was duly carried out with heartening results, an excellent crop being obtained very free from disease, and with the trees looking extraordinarily healthy. So good were the results, in fact, that I started to take prizes at shows—a great encouragement to a beginner.

By this time, I had discovered what were the main troubles. My orchard suffered from Apple Aphides, Woolly Aphis, Apple Sawfly, various Winter Moths, Red Spider

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and a small amount of Scab and Mildew. Capsid was not present (although I had several scares about it) and for this I was profoundly thankful, knowing the expense to which others had been put in trying to get rid of this trouble.

The spraying programme is now somewhat modified, but is carried out as thoroughly as ever. It includes a $7\frac{1}{2}$ per cent. winter wash in February, two pre-blossom sprays of lime-sulphur and lead-arsenate, a nicotine wash seven days after petal-fall, followed, directly afterwards, by another lime-sulphur and lead-arsenate application. Then sulphur-dusting if Scab is more evident than usual, and another nicotine wash for trees that show more Woolly Aphis than I like.

Apple Sawfly was the worst pest at first, but the trouble seems to be reduced considerably by picking and burning affected apples at an early stage, and by the post-blossom nicotine spray. Scab became more prevalent last year, so sulphur dusting was introduced; and the two pre-blossom lime-sulphur and lead-arsenate sprays this year (1933) will, it is hoped, control Red Spider, which appears to be on the increase. In my opinion, money expended on necessary spraying, efficiently carried out, is always more than repaid.

Pruning.—I was very drastic in the first year's pruning, cutting out the centres and using the saw rather ruthlessly, so much so that the expert seemed rather troubled, feeling that his advice had been taken too literally, and told me to go slower. However, I have never regretted the severity of this first treatment which brought the trees into the desired "goblet" shape. To keep them thus has been the aim ever since, and each remaining branch is pruned by shortening the laterals and cutting back to fruit buds, with the object of making each a cordon.

Manuring.—It seemed fairly obvious that to take fruit out of an orchard without putting anything back must eventually lead to diminished crops, so I went into this matter with another expert. He advised that, for the present, sulphate of potash, at the rate of 2 cwt. per acre, was all that was required. With the trees making excellent growth, and good colour on the fruit, nitrogen was unnecessary and inadvisable. Digging round each tree during winter, and attention to hoeing, would make available all

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the nitrogen required. For the present, therefore, the potash programme is being pursued, but I contemplate trying, next year, a small patch with nitro-chalk.

Thinning.—On the appearance of the first good crop, I decided that all apples marked in any way by pest or disease should not be allowed to grow to maturity, taking nutriment away from those that were perfect. Accordingly, all the damaged fruits were gathered and burnt. Since then the process has been carried a step further, being, in my experience, one of the most important points in fruit culture. Obviously, a tree cannot produce more than a certain number of apples of commercial size and, to get this, one must thin the crop if it is at all heavy. The Worcester Pearmain, especially, needed this treatment, and all trusses on them were thinned to a single apple. Although fears of being too drastic often arose while thinning, any doubts were dispelled when the crop was gathered, and I have often thought that the thinning might have been even more severe.

Picking, Grading, etc.—Having incurred considerable trouble and expense in producing good apples, one naturally wants to get them into the consumer's hands without any loss of condition. Careless picking, grading and packing may undo all the labour and effort expended on production. My helpers at the cropping season are instructed, therefore, that apples must be handled as delicately as eggs, and I insist on this being borne in mind during each operation. Samples are on hand exhibiting all the usual points of damage, e.g., one badly picked, showing all the five finger marks made in plucking; another that has been dropped, and so on. All orchard boxes and picking baskets are lined with corrugated paper, and all barrows and trolleys used in the orchard are fitted with caterpillar wheels.

Sizing is done by hand with the aid of boards (tops of B.S.A. boxes) in which holes of appropriate size have been cut. The operation is done very carefully, of course, generally by taking the apple in the left hand and lightly resting the sizer over it till the gauge has been determined. Girls quickly become expert at this work; usually, their eye judgment has only to be confirmed by one movement of the sizing board.

The sized apples are then graded for quality, the girl employed having four boxes in front of her. One, directly

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in front, contains the apples to be graded; a second, with a smudge of blue paint on the end, stands to her right for the "Extra Fancy" grade; the third, smudged with red, stands to the left for the "Fancy"; and the fourth box, on the centre of the table, is for rejects not considered fit for packing. Grading, I consider, is the most difficult job in the marketing of apples.

Packing.—My entry into the fruit-growing industry happened to coincide with the start of apple packing under the National Mark, and National Mark packing seemed a very good proposition for an unknown grower like myself. It was all very well for men widely known in the wholesale markets to send fruit along under their own labels, but a very different matter for me. How would buyers know that my apples were good and well-graded, and worth a price that would repay me for the trouble and expense of production? I could understand that, from the buyer's standpoint, apples from an unknown grower might be open to suspicion. The National Mark undoubtedly solved my difficulty, and I registered under the Scheme as soon as possible. Packing to prescribed standards involves extra work and expense, but having already decided that it was no good to grow apples unless they were carefully graded and packed for sale, nothing suited me better than to have a Government label to advertise the fact in all markets.

The apples in their "blue" and "red" boxes are carried from the grading to the packing shed, and there packed into boxes bearing the well-known National Mark labels. By insisting that the packer keeps the label towards her, you can always check, at a glance, whether she is packing into the right box; it is extraordinary how carefully this point has to be watched. The possibility of "Fancy" apples being packed into an "Extra Fancy" box is one of my nightmares.

Most of the apples are packed into boxes, either full-size or the half-box. Trays only pay me for the extra trouble and expense when the fruit, like the James Grieve, is large or easily bruised. Even then, every apple for a tray must be absolutely perfect and very well coloured. I find that one can build up a reputation in selected markets for small quantities of tray fruit.

Marketing.—That salesmen in the wholesale markets were the fruit growers' worst enemies was one of the first

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things of which I had serious warning from several other growers. One got the idea that salesmen "did you down" right and left, but my experience has been quite the reverse. Some of my best friends, from the business point of view, are the salesmen, who trust me never to let them down when they sell my fruit as first class. Prices, of course, are disappointing at times, but it is my opinion that the salesman always does his best for you, provided he can trust you; and it would seem to be his natural and obvious course if he is a business man. He has a difficult position in trying to satisfy both seller and buyer; but, as one of them pointed out to me, most salesman like to handle good stuff, which they will not get if they consistently favour the buyer. My advice is—have as many centres as you like to which to send fruit, but only one salesman at each; and although he may disappoint you occasionally, continue to send him regular supplies.

Orchard Heating.—Mention of orchard heating has brought smiles to many a grower's face, but I feel that some reference must be made to it. Late in the May of my first year's orcharding, a frost occurred which, I am now certain, considerably reduced the size of the crop. At the time, the disappointing result was attributed to the severe pruning, but, in the third year, another frost was experienced just when the trees were in full bloom, the crop being again disappointing; this time I definitely connected the two failures. So, at the beginning of my fourth year, I seriously considered what steps could be taken if frost threatened at a critical period. Naturally, one does not want all the work of a year undone if it can be prevented, so I cast around for advice on the subject and, luckily, was able to obtain a good deal of literature about orchard heating from the Shell Mex Company, learning that millions of gallons of fuel oil were consumed in America annually in combating late frosts. I, therefore, designed a specially-constructed heater to burn fuel oil, and distributed these heaters at regular intervals round the orchard, 35 to the acre. A thermometer was also fixed up in the open with a battery and bell attachment, so that, when the outside temperature fell to 34° F., the bell rang in my bedroom.

When I tell other fruit growers about these heaters, I generally find, at this point, that their smiles develop into hearty bursts of laughter. A late frost, however, can do

EXPERIENCES OF A FRUIT GROWER

a great deal of damage, and I feel that a considerable amount of trouble and discomfort is worth while on two or three nights during the critical period. Twice last year, I was called up, the first time about 2 a.m. The heaters were all lit up in about an hour, by which time the temperature outside the orchard had dropped to about 30° F., continuing to fall to about 27° F. at 4.30 a.m., when clouds came across the sky. The second awakening was about 3.30 a.m., and the heaters were kept going until the sun was well up. On both occasions, the temperature of the orchard was raised about three degrees. Although the getting-up was irksome, once up and about, the experience was not unpleasant; and as I had a bumper crop, and my neighbours did not, the heating seems to have done some good.

Finance.—Having bought a much-neglected orchard, I could not hope to make a profit on it straight away. A lot of money had to be expended in getting it into order. Crops, also, were poor at the commencement, but my orchard ledger now shows a definite balance on the right side. The trees are in excellent condition, and I am of opinion that the orchard will pay good dividends in the future, and that I shall start to reap the reward of my venture in fruit culture. It will be possible to say more about the financial aspect at the end of the next four years, but I really think that fruit growing is a good paying proposition if it is managed methodically and taken seriously.

The 1932 crop of my orchard was, approximately, 33 tons. Roughly, 70 per cent. of the crop was up to the standard of the National Mark Scheme, under which the fruit was marketed and realized excellent prices. The total of National Mark Fruit dispatched was as follows:—

<i>Grade.</i>	<i>Trays.</i>	<i>B.S.A. boxes.</i>	<i>Half-boxes.</i>	<i>Sieves.</i>
"Extra Fancy" ..	1,238	340	165	263
"Fancy" ..	—	187	158	83

The bulk of the packed fruit was marketed in Birmingham, Derby, Leicester, Leeds, Liverpool and Nottingham. A large amount was sold locally and most of this was "unpacked." All the low-grade fruit was marketed locally, but there was also a local demand for some of the high grades.

Some Conclusions.—Although still only a beginner, with but four or five years experience behind me, some of my

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conclusions about fruit growing may be of use to others who are about to start.

1. It is no use looking upon fruit growing as an easy way of making money. It is hard work and, although, at certain periods of the year, one can take days off, one must stick to the business most of the year round if it is to be a success. A thing that surprised me was that the work during winter was just as hard, or even harder, than at other seasons.

2. Common sense is very important to a fruit grower, for problems are always arising on which decisions have to be taken in which sound judgment plays an important part.

3. If any difficulty arises, there is always a knowledgeable Official who will advise you efficiently and courteously on application.

4. Unless the importance of efficient spraying is recognized, fruit growing is not worth while.

5. To get apples of good commercial size, a big crop must be thinned.

6. It is futile to expect to get good apples from a tree into which the sun cannot penetrate.

7. In starting an orchard, one should plant varieties that will crop at different times. I have often blessed the foresight of the original owner of my orchard for planting it with varieties that come along nicely one after another.

8. At all times, the orchard work should be planned well ahead, and the plans should be carried out to schedule, even if it is necessary to work overtime or employ extra labour. It is wiser never to trust to luck!

THE PRODUCTION OF HIGH-GRADE SEED POTATOES IN NORTH WALES

J. F. CURRIE, N.D.A.,

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ABOUT six years ago a scheme was started at Bangor to investigate the possibility of producing, in North Wales, high-grade seed potatoes that are free from or carry only a bare minimum of degeneration or "Virus" diseases.

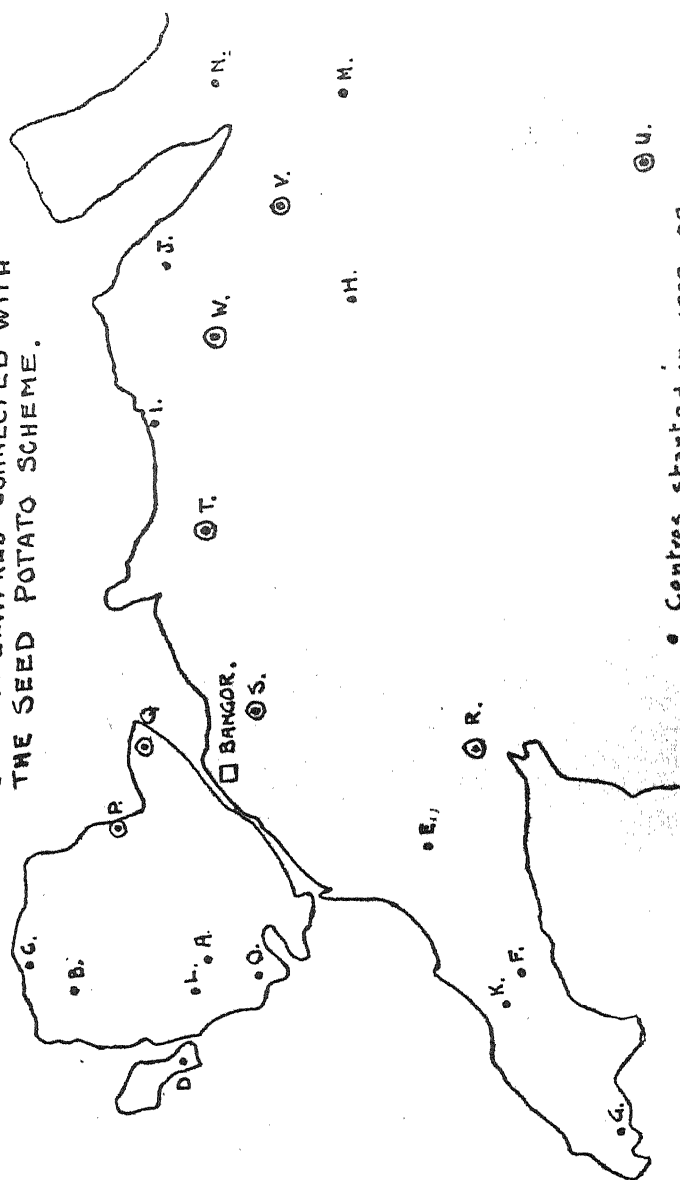
The scheme had its origin in a survey of farmers' potato crops made by Dr. T. Whitehead, Adviser in Plant Pathology at the University College, Bangor, in connexion with the study of virus diseases. This survey revealed the existence of districts in North Wales where potatoes have been grown without deterioration, and without change of seed, for a considerable number of years. Examination of the stocks in these areas showed them to be remarkably free from degeneration due to virus infection; and, in comparative yield trials with Scotch seed, they proved to be of equal cropping capacity. It appeared, therefore, that conditions in the districts referred to were unfavourable for the development of virus diseases, and that healthy stocks of potatoes could probably be produced in them. With the object of testing the value of these districts for seed-potato production, a small scheme was started in 1927. To plan the project on a commercial basis, however, it was necessary to work on a larger scale, and, in 1928, the Ministry of Agriculture made this possible by making a grant to enable the College to appoint a Supervisor and to put the scheme on a proper footing.

General Plan of the Scheme.—Since the whole scheme was based on the not unwarranted assumption that virus diseases alone are responsible for degeneration, it was planned to prevent their spread within the crops and to guard against infection reaching the crops from outside sources. Special stocks of superior healthy seed were supplied, therefore, to a number of selected growers who were admitted to the scheme on agreeing to the following conditions:—

- (a) That they would grow at least $1\frac{1}{2}$ acres of three varieties of potatoes from seed provided.
- (b) That they would grow only the stocks provided, and discard all others already in their possession.
- (c) That they would maintain these stocks for at least three years and introduce no others during the period.

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SKETCH MAP OF NORTH WALES
SHOWING CENTRES CONNECTED WITH
THE SEED POTATO SCHEME.



• Centres started in 1927-28,
⊙ Centres started in 1930.

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In the selection of centres, sheltered districts were avoided, and preference was given always to growers whose farms were situated in the more exposed coastal and upland areas. In view of the above conditions, regard was also paid to the ability and personality of the grower.

Under the 1927 scheme the growers were provided with certified True Stock Scotch seed of the varieties Great Scot and Kerr's Pink. For the 1928 centres, however, special seed from the Irish Free State was supplied, and Sharpe's Express was also grown. The Kerr's Pink had been raised under the direct supervision of the Ministry of Agriculture of the Irish Free State, and the Great Scot and Sharpe's Express were certified Athlone seed. The ideal, of course, would have been to start the scheme with seed from absolutely virus-free crops. Such seed, however, was not procurable because it did not exist. In any case, even if seed of this nature could have been obtained in reasonable quantity, after a season in the field it could no longer be regarded as more virus free than that used in the present work.

Ten centres were selected in 1928, and five were taken over from 1927. The distribution of the centres is shown on the accompanying outline map; it will be seen that they are mainly situated close to the coast.

Field Inspections.—Inspection of the growing crops was carried out as early in the season as possible, and, in the earlier districts, began usually about the end of May. The total number of plants of each variety was estimated at all centres. Every plant was examined separately for health and identity, and any rogues and unhealthy plants were immediately removed. Great importance was attached to the dates of these visits of inspection, and every endeavour was made to visit each centre twice before the beginning of July. The chief object of so doing was to ensure the removal of all possible sources of infection within the crop before infestation by aphides became general. Further, undesirable plants are much more easily removed if roguing is carried out in the early stages. The crops were kept under observation, during the remainder of the growing season, by further inspections made in July and August.

The extent to which virus diseases were found to occur in the stocks at the various centres each year is shown in Table I. It will be seen that in 1928 the amount of visible virus infection was very low at thirteen centres, and

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TABLE I.—THE INCIDENCE OF VIRUS DISEASES AT CENTRES STARTED IN 1927 AND 1928.

Centre and Year admitted to Scheme		1928	1929	1930	1931	1932
		per cent.	per cent.	per cent.	per cent.	per cent.
A	1928	.30	.26	.22	.30	.28
B	"	.34	.38	.19	.17	.05
C	"	.22	.16	.34	.35	.04
D	"	.15	.42	.22	.15	—
E	"	.31	.14	.29	.27	.15
F	"	.28	.26	.15	.28	.08
G	"	.40	.23	.23	.22	.09
H	"	.38	.33	1.57	1.56	2.42*
I	"	.31	1.63	33.00*	—	—
J	"	.48	.38	12.98*	—	—
K	1927	.30	.14	.17	.18	.29
L	"	.30	.58	2.48	1.78	.98*
M	"	.30	.26	1.41	—	—
N	"	2.58	1.72	3.70*	—	—
O	"	1.86	—	—	—	—

* Denotes those centres discarded from the scheme.

did not exceed 0.48 per cent. of plants. At the two remaining centres, both of which had been taken over from the 1927 scheme, a considerable development of disease was recorded. At centre N, this was due almost certainly to the presence of a diseased stock of Majestic which had been introduced contrary to the conditions of the scheme. At centre O, the crop was found to be infested with eelworms, and the diagnosis of virus symptoms was thus rendered extremely difficult. It is probable, therefore, that the figure shown represents the combined effect of eelworms and Leaf Roll. This centre was discarded in the following season when presence of eelworms had been confirmed.

Very similar results were obtained in 1929, except at one centre (I), where an increase to 1.63 per cent. was recorded. This was wholly accounted for by an outbreak of Leaf Roll in the variety Great Scot, amounting to 4.18 per cent. In spite of the fact that every plant exhibiting symptoms of virus infection was removed before the beginning of July there was a significant rise to 33 per cent. in the following season, when the centre was discarded.

Since evidence of degeneration in a stock of potatoes is almost certain to be disclosed within three years, the observations in the following year, 1930, were regarded as critical. At eight centres less than 0.5 per cent. of virus

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disease was found. Therefore, practically no increase of virus infection had occurred, and the stocks were as healthy as when introduced three or four years previously. The maintenance of this excellent condition of health indicated that the centres were well suited for the production of seed potatoes. At three other centres, the amount of disease showed a slight increase, but in no case did it reach 3 per cent. Since less than 5 per cent. of virus infection in a stock is not likely to affect the yield to a measurable degree, it will be seen that seed potatoes of considerable value were still being produced at these three centres. The spread of virus diseases assumed significant proportion at two centres only. The rapid spread at centre I has already been mentioned, but it will be seen that a very considerable increase took place also at centre J, the reason for this being unknown. Since both were obviously unsuited for the purpose in view they were discarded from the scheme. Work was discontinued at centre N on account of the breach of conditions to which reference has already been made.

During subsequent growing seasons, changes in farm tenancy brought about the withdrawal of two centres from the scheme, so that the number was reduced in 1931 to ten, and in 1932 to nine. The results given for both of these years confirm those obtained in 1930. Seven centres continued to maintain potato stocks containing less than 0.5 per cent. virus diseases. This is an exceptionally high standard of health, and since this has been maintained now for five and six years respectively, it is obvious that these centres are capable of producing seed potatoes of excellent quality. At centres H and L, the amount of disease has remained considerably above the standard of 0.5 per cent. Although the stocks at these two centres are still of quite good quality they fall short of the standard that must be maintained, and it has been decided that these centres should also be discontinued.

Extension of the Scheme.—With the experience and encouraging results gained, the scheme was extended, in 1930, to new districts. Eight new growers were selected and were supplied with seed from one of the successful centres mentioned above. Again, however, a change of tenancy caused the reduction of the number in this group to seven. Table II shows the incidence of virus diseases during each year at the centres started in 1930. In every

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TABLE II.—THE INCIDENCE OF VIRUS DISEASES AT
CENTRES STARTED IN 1930.

Centre	1930	1931	1932
	per cent.	per cent.	per cent.
P	.32	.24	.36
Q	.30	.20	.21
R	.22	.11	.13
S	.32	.25	.25
T	.45	.94	.34
U	—	.06	.12
V	.24	.39	.33

instance, under 0.5 per cent. of virus infection was recorded in 1932, and, with one exception, this standard has been maintained throughout. This exception was at centre T, where the amount of disease in 1931 showed a slight increase to 0.94 per cent., and this was believed to have been caused by the presence of "groundkeepers" from a previous crop that had apparently contained plants affected with Leaf Roll. A very thorough roguing was carried out and appears not only to have prevented further increase but also to have brought about a reduction in the amount of disease. Under the conditions prevailing at these new centres, therefore, it is apparent that healthy stocks are being produced; and, along with the successful centres from the first group, they have been established, for marketing purposes, as suitable for the production of seed potatoes of certified standards.

A further extension was carried out to twelve new centres, the stocks at which came under the observation of the scheme for the first time in 1932. Before any recommendation can be made with regard to these it will be necessary to show that, after three years, the standard of less than 0.5 per cent. of virus infection has been maintained. It is premature, therefore, to report progress at these centres; but since they were very carefully selected, and since the stocks were all up to the required standard in 1932, it is expected that they will prove satisfactory.

Yield Trials.—From the point of view of health and vigour, the stocks at the successful centres compared very favourably with any in commerce, but careful yield trials were necessary to test their value in respect of cropping capacity. Since 1930, therefore, a series of yield trials, in

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which the Welsh seed was compared with Scotch seed, has been carried out each year, both at the College Farm and in a number of counties throughout Wales. A quantity of seed of each variety was obtained in the early part of each winter from the growers engaged in the scheme. After having been mixed in equal proportions from the different centres, this constituted the stock of Welsh seed used for the trials. The Scotch seed was obtained at the same time as the Welsh seed and came from a reliable source in Banffshire. The attempt was always made to secure the superior grade of Scotch seed known as "Stock Seed," but usually this was available only in the varieties Great Scot and Kerr's Pink. Both the Welsh and Scotch seed were boxed and stored under identical conditions until planting time.

Throughout the trials the plots were arranged to ensure uniform conditions of growth for the two classes of seed. At the College Farm, each variety constituted a separate trial, in which Welsh and Scotch seed were replicated eight times in alternate rows, each row representing a unit plot of 50 plants. The cropping capacity of each class of seed was calculated on the average yield of the eight plots by which it was represented in the trial. The plots were kept under careful observation during the growing seasons, but rarely could any difference in health, vigour or foliage features be discerned. The consistently good results given by the Welsh seed, in comparison with the Scotch, in the trials at the College Farm, is shown in Table III.

TABLE III.—YIELD TRIALS AT THE COLLEGE FARM, ABER.

	Sharpe's Express	Great Scot	Kerr's Pink	Arran Banner
	Tons per acre	Tons per acre	Tons per acre	Tons per acre
1930				
Welsh Seed	15.60	15.92	15.10	—
Scotch Seed	15.02	15.10	15.65	—
Difference in Yield	.58	.82	— .55	—
1931				
Welsh Seed	12.81	15.57	17.38	18.88
Scotch Seed	9.92	12.97	15.97	15.18
Difference in Yield	2.89	2.60	1.41	3.70
1932				
Welsh Seed	6.81	16.55	14.01	19.42
Scotch Seed	6.78	16.38	13.60	18.71
Difference in Yield	.03	.17	.41	.71

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TABLE IV.—YIELD TRIALS IN THE COUNTIES—AVERAGE OF RESULTS OBTAINED AT A NUMBER OF CENTRES.

	Sharpe's Express	Great Scot	Kerr's Pink	Arran Banner
	Tons per acre	Tons per acre	Tons per acre	Tons per acre
1930 Number of trials	8	11	9	
Welsh Seed	10.07	14.19	12.96	---
Scotch Seed	9.74	14.13	12.89	---
Difference in Yield	.33	.06	.07	---
1931 Number of trials	8	8	8	5
Welsh Seed	7.77	10.79	11.45	13.85
Scotch Seed	8.22	10.56	11.19	12.86
Difference in Yield	-.45	.23	.26	.99
1932 Number of trials	4	5	5	4
Welsh Seed	7.44	12.69	11.95	16.06
Scotch Seed	7.77	12.71	10.29	15.20
Difference in Yield	-.33	-.02	1.66	.86

Table IV summarizes the results of the County trials, which were carried out under the supervision of the Agricultural Organizers in the respective counties. In this Table, it is impossible to show separately the results obtained in each individual trial. The figures given, therefore, represent the average of the yields obtained, together with the number of trials in which each variety was tested. Briefly, the trials in the counties confirm the excellent results secured on the College Farm.

The actual yields obtained in these trials are of relatively little importance, since they fluctuate from year to year with the soil and climatic conditions under which the crop was grown. This explains the yearly variations in yield that are shown in Tables III and IV, and are particularly noticeable with Sharpe's Express. The drop in the yield of this variety, during the three years 1930 to 1932, cannot be attributed to any deterioration in the quality of the Welsh seed since it is paralleled by the Scotch seed, which came direct from Scotland each year. It should be emphasized that the main point of importance in connexion with these trials is the comparative yields of the two classes of seed.

The stocks produced at the centres started in 1930 were tested for the first time in 1932. These were included in the trials at four centres, and the average results are given in Table V. The cropping capacity of the stocks from these

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TABLE V.—YIELD TRIALS WITH WELSH SEED FROM
CENTRES STARTED IN 1930.
AVERAGE RESULTS FROM FOUR CENTRES.

	Sharpe's Express	Great Scot	Kerr's Pink
	Tons per acre	Tons per acre	Tons per acre
Welsh Seed	9.27	13.77	11.67
Scotch Seed	8.97	14.21	10.85
Difference in Yield	.30	— .44	.82

new centres is also as good as that of the best Scotch seed.

Taking the trials as a whole, it is evident that the farms participating in the North Wales Seed Potato Scheme are producing seed potatoes of a very high standard of health, and consequently of high-yielding capacity. Because of the high reputation quite fairly attributed to Scotch seed it was not expected that the North Wales stocks would prove superior. It has been clearly demonstrated in this series of trials, however, that seed potatoes certified under the conditions of this scheme are at least equal to the best stocks from Scotland.

Aphis Survey.—In view of the relation of aphides to the spread of virus diseases, a survey of the extent to which the crops were infested with these insects was carried out in conjunction with Dr. Maldwyn Davies, Adviser in Entomology. Contrary to expectation, it soon became apparent that aphides were present at all centres during some part of the growing season. Although the first appearance of aphides generally occurred early in July, there was a distinct difference in the dates at which they attained maximum numbers. Thus, at the centres in Anglesey, Denbighshire and Flintshire, the period of maximum infestation occurred from the middle to the end of July, while, at the centres in south Caernarvonshire, this period was delayed until the middle of August. Analysis of the aphis population showed that *Myzus persicae*, the species known to transmit Leaf Roll, commonly constituted 25 per cent. of the total, while almost the whole of the remaining 75 per cent. was made up of *Macrosiphum gei*, a species that does not so readily transmit virus diseases. In a series of glass-house experiments, in which the infective condition of a

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representative sample of aphides from each of five centres was tested, it was found that transmission of Leaf Roll to healthy plants took place only when the sample contained *Myzus persicae*. More detailed information concerning this aspect of the work has already been published.*

Discussion of Results.—The results presented show that virus diseases have been kept in abeyance, and that healthy seed potatoes of high-yielding capacity are being produced at fourteen centres in North Wales. This number would almost certainly have been sixteen but for changes of tenancy which caused the withdrawal of two successful growers. Since the success obtained at these centres cannot be attributed to the scarcity of aphides or to their non-infective condition, the situation and conditions prevailing at the centres is of some interest. The majority have certain features in common, the combined effects of which may account for their relative freedom from virus diseases.

1. They are situated in bleak and unsheltered districts; ten are in close proximity to a very exposed part of the sea coast, and four, although inland, are situated at a considerable altitude. Although aphides were present at all centres, the climatic conditions would tend to prevent the aphid population from reaching average numbers, particularly before the end of July.
2. The type of farming practised in these areas is chiefly pastoral, and potato fields are small and relatively far apart. This certainly gives the centres a measure of isolation from outside sources of infection.
3. At centres situated near the coast, the prevailing wind from the sea seems to cause a premature ripening of the crops; even the haulms of Kerr's Pink are down before the end of August. An effect very similar to this is brought about by Blight, which occurs early at all centres and causes premature destruction of the foliage. Both premature ripening and the early incidence of Blight are believed to have the same effect as "early lifting," which is known to minimize the amount of virus infection in the crop.

The less successful centres were all situated in more sheltered localities, and the crops were generally considerably later in reaching maturity. At the two centres, I and J, where the amount of virus diseases reached significant proportions, isolation from other potato crops was less complete. It is perhaps significant also that, at these two centres, the period of maximum infestation of aphides was three or four weeks earlier than at most of the successful centres. At one of the latter, however, this period occurred practically at the same time, but, in this instance,

* Whitehead, T., J. F. Currie and W. Maldwyn Davies: Virus Diseases in relation to Commercial Seed Potato Production. *Ann. App. Biol.*, Vol. XIX, No. 4, 1932, p. 529.

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early ripening of the crop took place. At the remainder of the successful centres, some form of early maturity occurred, and the period of maximum infestation with aphides was delayed until mid-August. It is suggested, therefore, that one of the factors influencing the production of healthy seed potatoes may be the relation between the date of maximum infestation with aphides and the stage of maturity of the crop.

Marketing.—In addition to the production of healthy stocks, it has been an integral part of the scheme, since its inception, to promote and encourage the sale of North Wales seed potatoes. Previous to 1930, no official designation could be applied to the stocks, and they were sold on a guarantee of purity only. In 1930, however, the field observations and the excellent results of yield trials established the fact that the mode of operation and the system of repeated thorough inspections resulted in the production of seed potatoes of proved high merit. It was decided, therefore, at a conference of growers, to offer the stocks for sale as North Wales Certified Seed Potatoes, containing not more than 0.5 per cent. of virus diseases and pure to the extent of 99.5 per cent. Arrangements were made each year by the growers to market the seed under a joint scheme, which included the fixing of minimum prices and the adoption of high standards of grading and packing. Over forty tons of certified seed were available in 1930, and, with a general increase in the acreage and the inclusion of new centres, this amount was increased to almost one hundred tons in 1932. The stocks have met with a ready sale, and the best market prices have been obtained.

As long as the volume of supplies was small, this system has worked quite satisfactorily, but as the quantity of certified stocks is increasing, the need is felt for an organization of a more permanent character. At present, therefore, arrangements are in progress to form a Marketing Association of Growers. Regulations relating to standards of certification and to eligibility of growers have been drawn up, and the model rules of the Welsh Agricultural Organization Society have been adopted to cover the general activities of the Association.

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BULKINESS OF FOOD AS A FACTOR IN POULTRY FEEDING

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MUCH study has been devoted in recent years to the establishment of feeding standards for poultry. The scientific principles of poultry feeding are now well understood in their broad aspects, and an excellent summary of present knowledge and practice is to be found in a recent publication of the Ministry of Agriculture and Fisheries.*

A factor in poultry feeding to which some importance has been attached in recent years is that of the bulkiness of the food supplied. A certain amount of food is used up by the animal or bird in living and growing; this is known as the *maintenance ration*. It is only the additional amount over and above this maintenance ration that can be used by the animal or bird for producing meat or milk or eggs; this portion is called the *production ration*. Obviously, the amount of milk produced by a cow or the number of eggs produced by a hen will depend, among other factors, on the amount of food actually eaten by the animal in excess of the maintenance ration. A limiting factor will be the physical capacity of the animal or bird to absorb the food available—in other words it will depend to some extent on the bulkiness of the food. The capacity of most farm animals to take up food is well above the maximum production ration required to maintain a normal high output of meat or milk, and the bulkiness of the food is of secondary importance. With certain small rapidly-growing animals, such as poultry, however, the position is different; the output of eggs or of meat is so rapid that the production ration must bear a notably bigger ratio to the maintenance ration than is necessary with the larger slower-growing animals. Bulkiness may become a factor of importance—even of dominating importance—in poultry feeding. It follows that one consideration in the study of feeding standards for poultry must be the bulk or cubic content of the food.

* The Scientific Principles of Poultry Feeding. By E. T. Halnan, M.A. Ministry of Agriculture and Fisheries, Bulletin No. 7, 2nd Ed., 1932, 37 pp., 9d.

THE FACTOR OF BULK IN POULTRY FOODS

The following considerations will make the point clear. In the publication referred to above, E. T. Halnan states that for an adult bird a daily consumption of 4 oz. of food or thereabouts is always assumed. On the other hand, he found by feeding trials that the maximum amount of food adult fowls would eat daily as mash was 290 cubic centimetres. On the basis of these figures it would appear that no food or mixture of food fed to fowls as a mash should exceed 72.5 c.c. per oz. Halnan determined the volumes of certain foods in common use among poultry feeders and found them to vary from 39 c.c. to 185 c.c. per oz. according to their nature and mechanical condition. Thus 1 oz. of wheat measured 39 c.c. as grain and 50 c.c. as meal; and 1 oz. of broad bran measured 185 c.c. dry and 140 c.c. wet. The figures for bran are particularly striking; they mean that if we assume the food capacity of an adult fowl to be 290 c.c. it could eat only a trifle more than 2 oz. of wet bran daily. It follows that in constructing rations for poultry it is essential to pay strict attention to the volume or bulkiness of the food, and it might be concluded from the figures given that bran should be used sparingly.

Two important questions arise, however, which do not appear to have been examined at all closely, and may be considered separately.

1. Are the published figures for the bulkiness of bran and other feeds capable of application to practical conditions of feeding?

The measurement can scarcely be regarded as precise. "Round" figures with a reasonable range of variation are alone valid. It is not true, for example, to say that the volume of 1 oz. of strong wheat (whole) is 39 c.c. and that of weak wheat (whole) 44 c.c., since precise figures should only be applied practically with considerable reserve. The volume of 1 oz. of whole wheat will depend on many factors, such as size and shape of the grains, textures of the kernel, moisture

TABLE I.—REPRODUCIBILITY OF BULKINESS MEASUREMENTS.

Measuring cylinder of of 1.9 in. diam.	Vol. (c.c. per oz.) Replicate determinations				
	1.	2.	3.	4.	5.
1. Scattered in from a scoop ...	125	135	137	140	140
2. Container bumped lightly against palm of hand for 30 secs. ...	110	115	110	107	—
3. Bumped heavily against paper pad on bench ...	110	100	110	102	—
4. Pressed down by hand using plunger, and pressure released	90	93	93	90	70
5. Ditto using heavy pressure	85	87	95	88	95
6. Contents shaken loose ...	125-130	135-140	—	—	—

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content, moisture history (e.g., if wheat containing 20 per cent. of moisture is dried, however carefully, to 15 per cent. and then re-moistened to 20 per cent., the bulkiness is permanently altered—the volume being increased), the size and shape of the measuring vessel and the method of filling it.

It is, moreover, generally true to say that the bulkier the food the greater is the variation in measurement. With a very bulky food like broad bran there are wide differences between the measurements of different observers. Thus, for broad bran, dry and loose, E. T. Halnan found 185 c.c. per oz., V. G. Hanes* found 140 c.c., while figures obtained by J. Thomlinson in the Research Association's laboratories with one and the same sample varied between 190 and 220 c.c. The corresponding figures for *wet* broad bran, pressed down, were 140 c.c. (Halnan), 70 c.c. (Hanes) and 80-100 c.c. (Thomlinson). In the third case the pressure was removed before making the measurement.

Again, the figures given by Halnan for dry fine and coarse wheat middlings are 52 c.c. and 79 c.c. per oz. These figures are too precise to be applicable generally.

In view of these variations it seemed worth while to re-determine the bulkiness of certain of the common feeds in order to ascertain the degree of variability to be expected. The investigation was carried out by Mr. John Thomlinson in the laboratories of the Research Association of British Flour-Millers.

Three glass measuring cylinders graduated in 5 c.c. divisions were used for the work. The diameters of the cylinders were 2.6, 1.9 and 1.4 in. respectively.

Table I affords an indication of the degree of variation observed in replicate determinations *on the same sample*. On the whole the agreement obtained was satisfactory. It would undoubtedly be less satisfactory with measurements carried out (a) by different workers, (b) on different brans, (c) in different vessels.

In these experiments the brans used were a very fine one made on the laboratory mill from Manitoba wheat, a broad bran and a fine bran made commercially from an all-English grist.

The pressures used were quite small and were applied by means of a $3\frac{3}{4}$ lb. lead weight. They were equal to 0.6, 0.3 and 0.17 lb. per square inch for the narrow, medium and wide cylinders respectively.

The feeds were moistened by adding 40 c.c. of water to an oz. of feed in a basin and transferring the mixed mass to the cylinder.

The detailed results are given in Table II. A summary of the results comparing these figures with those of Halnan and of Hanes is given in Table III. The differences between the three sets of observations are considerable. The writers' figures for dry loose bran, middlings, maize meal and ground oats are higher than Halnan's, while their figures for the same materials wet are lower.

2. A consideration that may be of greater importance than the mere bulkiness of individual foodstuffs is the bulkiness of feed mixtures that form the mash. It does not follow that the volume of a mixture is equal to the sum of the volumes of the individual constituents. Indeed, as the figures of Table IV indicate, a very bulky food may be much less bulky when present in a mixture with finer foods. This apparently is due to the finer foods filling up the interstices between the particles of the coarser constituent of the mixture.

* Private communication to the writers.

THE FACTOR OF BULK IN POULTRY FOODS
TABLE II.—BULKINESS OF CERTAIN FEEDS.
(In c.c. per oz.)

Feed	Diam. of measuring cylinder	Vol. (c.c. per oz.)		
		Dry		Wet
		Loose	After removal of pressure	After removal of pressure
	in.			
Broad Bran (English wheat)	2.6	200	120	90
	2.6	200	130	100
	1.9	200	115	80
	1.9	200	120	90
	1.9	190	122	85
	1.4	218	103	78
	1.4	210	102	77
	1.4	216	—	78
Fine bran (English wheat)	2.6	175	130	100
	1.9	165	120	87
	1.4	156	110	82
Very fine bran (Manitoba wheat)	1.9	140	100	85
	1.4	136	108	85
Middlings (English wheat)	2.6	95	67	65
	1.9	95	70	65
	1.4	95	65	60
Maize meal	2.6	65	50	60
	1.9	63	50	63
Yellow maize meal	2.6	60	45	47
	1.9	57	45	47
" " " " (Another sample)	2.6	55	45	45
	1.9	57	45	45
Ground oats	2.6	80	60	55
	1.9	83	55	55
Sussex ground oats	2.6	95	63	53
	1.9	95	60	55
" " " " (Another sample)	2.6	80	53	60
	1.9	85	54	55

For example, the volume per oz. of wet bran (broad or fine) was 80-100 c.c., that of wet middlings 60-65 c.c., while that of the broad bran and middlings mixture containing up to 35 per cent. of bran gave a volume of 60-70 c.c.—substantially the same as that of wet middlings alone.

Maize meal, ground oats and Sussex ground oats are sometimes used as alternatives for bran, and are individually far less bulky than bran, the volume per oz. being 45-65 c.c. (compared with 80-100 c.c. for bran). When mixed with middlings to the extent of 35 per cent. the volumes of the mixtures are hardly significant below those of bran-middlings mixtures, e.g., 55-65 c.c. compared with 60-70 c.c.

In other words, none of the foods and food mixtures of Tables II, III and IV, except bran alone, have a wet volume per oz. in excess of the maximum laid down by Halnan, viz., 73 c.c., and none can be

THE FACTOR OF BULK IN POULTRY FOODS

TABLE III.—VOLUMES IN C.C. PER OZ. OF CERTAIN FEEDS.

(Summary of Figures of Halnan, of Hanes and of the Research Association of British Flour-Millers.)

	Halnan*	Hanes†	Research Association
	c.c.	c.c.	c.c.
Broad bran, dry, loose ...	185	140	190-220
" " pressed ...	—	110	100-130
" " wet " ...	140	70	80-100
Fine bran, dry, loose ...	—	—	165-175
" " pressed ...	—	—	110-130
" " wet " ...	—	—	80-100
Middlings, dry, loose ...	79	—	95
" " pressed ...	—	—	65-70
" " wet " ...	70	70	60-65
Maize meal, dry, loose ...	49	—	55-65
" " pressed ...	—	—	45-50
" " wet " ...	—	—	45-60
Ground oats, dry, loose ...	53-74	—	80-95
" " pressed ...	—	—	55-65
" " wet " ...	—	—	55-60

said to have an advantage over the others as regards their use in wet mashers from the point of view of bulkiness. The figures for bran alone are of little practical value, since bran is seldom fed alone to poultry, and only on occasion to other classes of stock.

The bulkiness of the foods dry is also of interest. The "loose" figures are probably not important. Dry mashers are given loose, but the churning action inside the bird's crop compresses the food to some extent. The bulkiness dry and pressed (after removal of the pressure) are therefore probably of greater significance. Of the bran-middlings mixtures, containing up to 35 per cent. of bran, the highest figure given in Table IV is 85 c.c. Even on this high basis the weight of 290 c.c. would be a trifle under 3½ oz., whereas the amount per diem has been assumed for all practical purposes to be 4 oz. It must be remembered, however, that wet and dry mashers both figure in practical feeding, and that the food taken in the form of a dry mash does not remain dry in the bird's crop. The bird drinks as well as eats, and the dry mash rapidly becomes a wet one in the crop, with a corresponding decrease in bulkiness.

It would seem that the apparent bulkiness of bran cannot be regarded as detrimental in so far as bran is used as a constituent of dry or wet laying mashers up to 35 per cent. or so. At any rate, actual measurements of bulkiness do not support the view that bran is undesirable on account of this character.

The data supplied in Tables III and IV suggest that, in the first place, the figures given in Bulletin No. 7 for the

* Halnan's figures appear to be for unpressed material although this is not stated.

† Private communication to the writers.

THE FACTOR OF BULK IN POULTRY FOODS

TABLE IV.—BULKINESS OF CERTAIN FEED MIXTURES

Feed	Diam. of measuring cylinder	Vol. (c.c. per oz.)		
		Dry		Wet
		Loose	After removal of pressure	After removal of pressure
	in.			
1½ oz. broad bran, plus	2.6	130	90	75
1½ oz. middlings	1.9	130	93	70
	1.4	130	88	63
1 oz. bran, plus 2 oz.	2.6	115	85	65
middlings	1.9	115	85	70
	1.4	112	78	60
½ oz. bran, plus 2½ oz.	2.6	105	75	60
middlings	1.9	105	75	62
	1.4	104	72	60
1 oz. bran, plus 2 oz.	2.6	115	85	70
middlings	1.9	115	85	65
	1.4	106	78	62
1 oz. maize meal, plus	2.6	85	67	60
2 oz. middlings	1.9	83	65	63
1 oz. yellow maize	2.6	80	65	60
meal, plus 2 oz.	1.9	80	60	60
middlings				
Ditto (another sample)	2.6	80	65	65
	1.9	80	60	60
1 oz. ground oats,	2.6	95	70	58
plus 2 oz. middlings	1.9	93	67	60
1 oz. Sussex ground	2.6	100	70	62
oats, plus 2 oz.	1.9	98	67	60
middlings				
Ditto (another sample)	2.6	93	70	55
	1.9	93	67	60

bulkiness of various poultry foods are not in themselves of a sufficiently generous range, and that, further, such figures as may be supplied for individual foods have no practical significance, in that they bear little relation to the *total bulkiness* of the feed mixture.

Reference has already been made to the fact that the volume of any feed mixture is not equal to the sum of the volume of its individual constituents, as has been often wrongly assumed.

THE FACTOR OF BULK IN POULTRY FOODS

Having in mind the above findings, it is interesting to examine their practical bearing on the compiling of rations.

It is generally assumed that the daily maximum consuming capacity of an adult bird is 290 c.c., and that, therefore, any feeding standards based on a daily consumption of 4 oz. per bird would require a food volume not in excess of 73 c.c. per oz. To illustrate this principle, the following ration was selected from Bulletin No. 7 as being typical of the most commonly employed mashes in use, and this or some modification of it is the one most usually employed in the County Egg Laying Trials:—

Bran	..	..	2 parts
Middlings (coarse)	..	..	4 „
Maize meal	..	..	2 „
Sussex ground oats	..	..	1 „
Meat and bone meal	..	..	1 „
Grain feed—Yellow maize	..	10	„

An examination of this mash led to the conclusion that it had only sufficient protein to enable the bird to produce 8 eggs per lunar month, but sufficient starch equivalent to produce 22 eggs in the same time, and that, therefore, it was unbalanced. It was suggested that to secure a proper degree of balance for successful egg production, the meat and bone meal should be increased to 30 per cent. of the mash.

Employing the revised figures for the bulkiness of foods given in Tables III and IV, and making use of the analytical figures for the various foods given in the Appendix to the Ministry of Agriculture's Bulletin, the following sets out both the volume per oz. and the food value of the above mash:—

	<i>Volume in c.c.</i>		<i>Digestible Protein</i>	<i>Starch Equiv.</i>
2 oz. bran ..	180	2 grms. bran ..	.182	.672
4 oz. middlings (coarse) ..	260	4 grms. middlings (coarse)	.524	2.244
2 oz. maize meal	110	2 grms. maize meal ..	.158	1.518
1 oz. Sussex ground oats ..	55	1 gm. Sussex ground oats ..	.068	.567
1 oz. meat meal	45	1 gm. meat meal ..	.557	.790
10 oz. corn (maize and wheat) ..	410	10 grms. corn (maize and wheat) ..	.910	7.500
	<hr/> 1060		<hr/> 2.399	<hr/> 13.291

Note.—It may be observed that the analysis of the above mash is different from that given in Bulletin No. 7, this being accounted for by the fact that use was made of the figures for fine middlings, whereas in fact those for coarse middlings should have been employed. In the same way meat meal figures should have been used in place of meat and bone.

THE FACTOR OF BULK IN POULTRY FOODS

Of the above ration, 1 oz. has a volume of 53 c.c., giving a possible maximum daily consumption of 5.47 oz., or 155.07 grms. As 20 grms. of the mash contain 2.399 grms. of digestible protein and 13.291 grms. of starch equivalent, it follows that the food value of the 155.07 grms. consumed is 18.7 grams. of digestible protein and 103.595 grms. of starch equivalent.

If the amount required for the maintenance of a $3\frac{1}{2}$ -lb. White Leghorn pullet is assumed to be 6.95 grms. of digestible protein and 54.9 grms. of starch equivalent, there would remain 11.85 grms. of digestible protein and 48.69 grms. of starch equivalent for egg production.

On the basis, therefore, of the table in the Appendix to Bulletin 7 of the Ministry of Agriculture, there is sufficient protein in the above mash to produce slightly over 22 eggs per lunar month and sufficient starch equivalent for the production of 34 eggs in the same time.

The mash in its present form, therefore, approximates to the required balance, though substantial improvement could be effected by feeding 3 parts of the mash to 1 of corn.

In spite of the greater volume per oz. this latter arrangement entails, it would supply the bird daily with 18.75 grms. of digestible protein and 90.13 grms. of starch equivalent, which, after the necessary deduction for maintenance requirements, would leave sufficient protein for the production of 22 eggs per lunar month and an available starch equivalent for 24 eggs in the same time. Such a mash fed would provide a perfectly balanced feed, supplying sufficient nutriment for the production of 286 eggs a year.

To illustrate more clearly the fallacy underlying the bulk theory as it applies to the compiling of poultry mashes, an examination of an altogether exceptional mash, containing abnormally high quantities of bran, will serve a useful purpose.

The growing and rearing mash, as employed by Mr. R. Rodwell, of Helmsore, Manchester, is selected for this purpose, as it has given excellent results in practice, both with regard to growth rates and the maintenance of stamina in the flock, whilst it is generally regarded scientifically as being too bulky to supply sufficient nourishment to meet the requirements of birds.

THE FACTOR OF BULK IN POULTRY FOODS

The mash is as follows:—

6 parts	home-milled bran
1 „	fine middlings
1 „	oatmeal
8 „	corn

The figures in column 3 of Table III indicate that the volume of 16 oz. of the ration is as follows:—bran 540 c.c., fine middlings 65 c.c., oatmeal 55 c.c., corn 328 c.c. (Halnan), a total volume of 988 c.c. for 16 oz., or a volume per oz. of 62 c.c. (See figures for feed mixtures in Table IV.)

On this basis, and having in mind the capacity of the bird, it will be possible to secure a daily consumption of 4.67 oz., or 132.39 grms. The analysis of the mash, again using the figures given in the Appendix to the Ministry's Bulletin, is as follows:—

					<i>Digestible Protein</i>	<i>Starch Equivalent</i>
6 grms.	bran	..	..	..	.546	2.016
1 „	fine middlings	..	..	..	.064	.748
1 „	oatmeal	..	..	..	.068	.567
8 „	corn	..	..	..	.632	6.000
					<hr/> 1.310	<hr/> 9.331

It will be seen that 16 grms. of the ration contain 1.31 grms. of digestible protein and 9.331 grms. of starch equivalent, so that 132.39 grms. would contain 10.855 grms. of digestible protein and 77.183 grms. of starch equivalent.

Assuming a pullet weight of 3 lb., then Bulletin No. 7 of the Ministry of Agriculture indicates that for growth and maintenance such a bird would require daily 6.5 grms. of digestible protein and 51.7 grms. of starch equivalent.

A simple calculation serves to show that 2.82 oz. of the above ration supplies 6.5 grms. of digestible protein and 46.5 grms. of starch equivalent. In other words, the mash is well balanced—possibly slightly low in its starch equivalent, but otherwise of sufficient concentration to enable the bird to consume nearly 5 oz. a day, but requiring less than 3 oz. daily consumption to supply all the necessary ingredients for successful growth and rearing.

It is on occasion reported that actual cases of failure in egg production may be attributed to the over-bulkiness of the feeding, and in this respect a severe limitation in the use of bran is suggested.

THE FACTOR OF BULK IN POULTRY FOODS

Of the two mashes analysed above, the first was a laying mash containing 20 per cent. of bran, and was shown to be capable of producing, on a daily consumption of less than 5 oz., nearly 300 eggs a year, an egg yield frequently achieved in practice with this mash; and the second was the rearing mash used by a well-known poultry farmer, and containing 75 per cent. of bran—yet capable of supplying all the necessary nourishment for proper growth and maintenance on a daily consumption per bird far below that of the bird's maximum capacity.

It is suggested, therefore, that the examination of these two mashes, both very successful in practice, substantiates the figures of Table IV and confirms the finding that bulkiness in the individual ingredients is not a matter of prime importance, but that the bulkiness of *the feed mixture* is the factor that should be taken into account. In such circumstances the theoretical bulkiness of bran disappears when translated into terms of feeding practice.

Conclusions.—The work described above demonstrates clearly that the bulkiness of individual foodstuffs is not an important factor in the practical feeding of poultry and, in particular, that the undoubted bulkiness of *dry* bran is no detriment to its use in considerable proportions as a constituent of poultry mashes.

It is the bulkiness of the ration—of the food mixture—which must be considered, not that of the individual foods composing it. The volume of a given weight of a food mixture is not equal to the sum of the volumes of the constituents, but is usually less, and sometimes much less. When the bulkiness of a food is due to its natural state of flakiness, as with bran, much of this bulkiness disappears when the food is compounded in a food mixture.

The bulkiness of either individual foods or of food mixtures *in the dry state* has no practical significance. It is the bulkiness of the foods when wet (e.g., as a wet mash) that is of importance.

The bulkiness of bran is in no way abnormal when the bran is fed in combination with other foods, i.e., in mashes. The inclusion of bran in wet or dry laying mashes up to 35 or 45 per cent. of the mixture neither limits food consumption by the bird nor interferes with the supply of the nutriment necessary for high egg-yields.

SHEEP SICKNESS OF PERMANENT PASTURE

The inclusion of bran in rearing and growing mashers can be even more liberal; feeding trials alone can indicate the desirable limit.

SHEEP SICKNESS OF PERMANENT PASTURE

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IN the grazing seasons of 1931 and 1932, a trial was conducted at the College Farm (Aber) of the University College of North Wales, Bangor, in order to compare the live-weight increments from permanent and temporary pasture. A short account of the trial is published at this stage owing to the emergence of a distinctive feature of the permanent pasture when grazed by lambs in the early autumn. In view of the extension that is occurring in the grass lamb industry, it is possible that these results may not be very uncommon; pastures laid down in the period following the first post-war slump in grain might not continue to give the good results hitherto obtained in fat lamb production.

The permanent pasture consists of a 7-acre field, considered locally to be fairly good fattening pasture, and has been down for at least 60 years. The temporary pasture, consisting of 4 acres laid down in 1927, is an average sample of that found on this farm. Botanical analyses carried out in both years, indicate that the predominant species of the herbage of the permanent pasture are bent grass (26 per cent.), Yorkshire fog (15 per cent.), and wild white clover (12 per cent.). In the temporary pasture, perennial ryegrass accounts for 40 per cent., wild white clover, 23 per cent., and rough-stalked meadow-grass, 20 per cent.

In stocking the plots, care was exercised to graze according to the amount of grass, thus preventing the possibility of a pasture competing under unfair conditions arising from over- or under-grazing. In-calf heifers in 1931, and 15-months-old heifers in 1932, were left on the plots practically throughout the experimental period, i.e., from early May until October. In the former year, the temporary pasture carried cattle at the rate of 0.75 animals

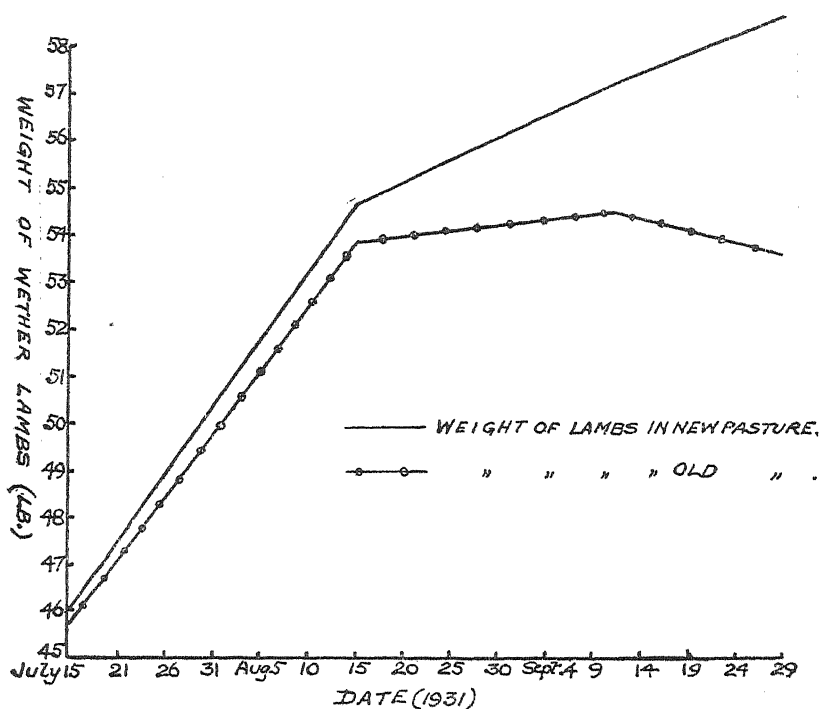
SHEEP SICKNESS OF PERMANENT PASTURE

per acre against 0.60 on the permanent; in 1932, the corresponding figures were 1.0 and 0.9. There was very little difference between the live-weight increase of the individual cattle on the two pastures, but, since there was a greater head of stock on the temporary pasture, the live-weight increment per acre was higher on that pasture, being 26 per cent. higher in 1931 and 17 per cent. in 1932.

In addition to the cattle, Welsh Mountain ewes, each with one lamb (by a Welsh ram) were put on the plots at the commencement of the season, and left until most of the lambs were ready for the butcher, i.e., until the beginning of July. The ewes averaged about 70 lb. at the beginning, and about 82 lb. when taken off; the lambs were about 28 lb. when put on the plots and averaged about 54-58 lb. when removed. The temporary pasture carried 5 ewes and 5 lambs to the acre in both years, against 4 ewes and 4 lambs on the old pasture. As with the cattle, there was not, on the whole, much difference between the increase in weight of the individual ewes and lambs on the two fields, but the greater number of stock supported by the new pasture resulted in a higher total production of meat from an acre of this grass. Thus, in 1931, the ewes and lambs on the new pasture produced 203 lb. live-weight increase per acre against 126 lb. on the old pasture, a superiority of 60 per cent. In 1932, the corresponding figures were 241 and 201, a superiority of 20 per cent. for the new pasture.

After the removal of the ewes and lambs, the plots were left free of sheep for about a fortnight, and then, in the latter half of July, stocked with newly-weaned Welsh Mountain wether lambs weighing about 45 lb. The lambs continued to thrive equally well on both pastures until about the middle of August, but after this date those on the new pasture drew ahead, the difference between the two lots widening as the season advanced, although there was no scarcity of grass on either field. In 1931, for example, both lots increased from an average of 45 to 53 lb. by the middle of August. By the middle of September the lambs on the temporary pasture had put on another 2.5 lb. against 0.6 lb. by those on the old grass. By the end of September, the lambs on the former pasture gained another 0.5 lb., but those on the permanent pasture had lost weight and were then no heavier than on August 15. The difference between the two lots of lambs was obvious, those on

SHEEP SICKNESS OF PERMANENT PASTURE



Increase of weight of wether lambs.

the old pasture plainly losing condition and their wool parting on their backs. Similar results were obtained in 1932, although the loss of condition of the lambs on the old grass in this season was not quite so pronounced. The accompanying diagram shows the difference in respect of live weight between the new and the old pasture in 1931.

In Table I (p. 340) are shown, for both years, the average live-weight increase per acre contributed by each class of stock, the total live-weight increment per acre for the season, and also the production for both years together.

Thus, the productivity of the temporary pasture, as measured by live-weight increase, exceeded that of the permanent pasture by 46 per cent. in the grazing season of 1931 and by 39 per cent. in 1932. In considering the relative merits of the two pastures, it is necessary to keep in mind that even the poorer of the two pastures is one of high productivity, as judged by other pastures in England and Wales. It may be added that both fields carry sheep in the winter and early spring and are extremely bare at the end of April.

SHEEP SICKNESS OF PERMANENT PASTURE

TABLE I.

Year	Class of Stock	Temporary Pasture		Permanent Pasture	
		Total live-weight increase in lb. per acre	Average increase per animal (lb.)	Total live-weight increase in lb. per acre	Average increase per animal (lb.)
1931	Ewes	60.7	12.1	23.7	7.4
	Lambs	142.5	28.5	102.5	26.7
	Wether Lambs	76.0	12.6	41.8	7.7
	Cattle	217.0	289.0	172.0	301.0
	TOTAL	496.2	—	340.0	—
1932	Ewes	75.5	14.8	68.8	16.5
	Lambs	165.7	31.2	131.8	30.0
	Wether Lambs	76.5	12.7	38.0	9.5
	Cattle	112.0	202.2	71.0	208.0
	TOTAL	429.7	—	309.6	—
1931 and 1932	All Stock ...	925.9	—	649.6	—

Autumn Effect of the Old Pasture on the Lambs.—The failure of the lambs to thrive after August on the permanent pasture touches a problem affecting many flock-masters in North Wales. In some instances, the lambs may simply cease to improve, but more frequently they lose condition and become too thin even to be sold as stores. On some farms, in some years, the lambs waste to such an extent that many die. In attempting to solve this problem, it is important to bear in mind that (a) there is no shortage of grass while the lambs lose condition; (b) mature sheep and growing cattle continue to thrive (from August 15 to September 29, 1931, the in-calf heifers on the permanent pasture at the College Farm increased by an average of 107 lb. per head, while the lambs made no increase in weight and were obviously in poorer condition at the end of the period than at the beginning); and (c) the loss of condition cannot be made good at once by removing the lambs to good young pasture—their health seems to have been fundamentally affected. At the College Farm, the lambs were not seriously affected, but, even here, although the lambs from both pastures were put on the same field of good maiden seeds at the conclusion of the trial, the gap

SHEEP SICKNESS OF PERMANENT PASTURE

between the lambs that had been on the new, and those that had been on the old pasture continued to widen. Those that had been on the old pasture continued to lose weight, showing that they were seriously affected in some way while there.

The loss of condition of the lambs on the permanent pasture must be due either to an infestation of parasites while there, or to a change in the nutritive character of the herbage, such a change affecting only the lambs. As a result of an examination of the fæces of both lots of lambs carried out some time after the lambs had been removed from the experimental pastures, 827 nematode ova were found per gramme of natural fæces from the permanent pasture lambs, against 172 from the others. This heavier parasitic infestation does not necessarily prove that the difference in condition of the two lots of lambs is caused by the lambs on the permanent pasture picking up more parasites than those on the new pasture. The greater number of parasites in the one lot of lambs may be the result, and not the cause, of their condition; recent work¹* shows the effect of nutritional condition on susceptibility to an infestation with a parasite. The continuation of the poor condition of the lambs, after removal to fresh young pasture, is one of the facts that might be cited in favour of attributing the cause to internal parasites.

Against the parasitic explanation, we have the splendid progress of the first lot of lambs, although it must be admitted that the period May to July, when they grazed the experimental pasture, was not that in which parasitic invasion is supposed to reach its height. Dr. R. F. Montgomerie, Veterinary Adviser at the College, has had considerable experience of wasting diseases of lambs in this province. He has encountered many outbreaks of parasitism in lambs in autumn, but he clearly differentiates another condition seen in lambs at that season, and characterized by wasting, in the causation of which worms appeared to play no part. He has found that lambs on certain good grazing lands do badly, and even become emaciated in some years, although post-mortem examinations in numerous instances have shown that parasitic worms were absent.

If the cause is nutritional, it is probably due to a change in minerals or protein in one or more of the constituents

* For references, see page 343.

SHEEP SICKNESS OF PERMANENT PASTURE

of the old pasture; it is not probable that all the constituents of the old pasture would change in this respect, while all those of the five-year-old pasture remained satisfactory. Bent grass and Yorkshire fog were the predominant herbage in the former, while perennial ryegrass and wild white clover formed the bulk of the herbage in the latter. The two latter constituents, which are generally regarded as the most desirable pasture plants, may have the power of maintaining the desirable mineral or protein condition late in the season, while bent and Yorkshire fog may fail in this respect under ordinary management. Bent is decidedly low in lime, and below the average in phosphoric acid,² while this grass tends to increase towards the autumn. In one of the Cambridge trials,³ for instance, this grass increased from 15 per cent. at the beginning of the season to 90 per cent. by October.

The idea that the cause is due to the presence of bent or of Yorkshire fog does not, however, find confirmation in the Cambridge observations³ on the nutritive value of a pasture throughout the season. One of the pastures examined contained abundance of bent, but continued to be satisfactory through the season; it was concluded that, if the pasture is kept closely grazed, the botanical composition is not important. The pasture at Aber was kept fairly closely grazed, as would be judged by a grazier, but was not kept so low as the frequently-mown Cambridge pasture. The continued highly-satisfactory increase in the weight of cattle not yet mature is another fact difficult to reconcile with the nutritive explanation of the Aber result. Woodman and Evans⁴ found that a mineral-deficient pasture, given in the form of hay to two adult sheep, was capable of supporting them for a considerable time, even when fed in a coarse and fibrous condition. Even granting that a mineral-deficient pasture may be slow in affecting adult stock, it is not easy to believe that such a pasture would enable in-calf and yearling heifers to increase in weight so satisfactorily.

Summary.—1. A temporary pasture in its 4th and 5th years produced 46 and 39 per cent. respectively more live-weight increase than a fairly good permanent pasture situated near to it.

2. The higher production of the temporary pasture was due mostly to its greater stock-carrying capacity.

HOT-WATER TREATMENT OF NARCISSUS BULBS

3. A condition of lambs, often said to be due to their grazing "sheep sick" land was observed in September amongst those lambs grazing the old pasture. This condition is by no means uncommon in late summer amongst lambs grazing old pastures. Whether this condition is caused by parasitism or by a nutritional defect of the pasture is not determined, but the question is briefly discussed.

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- ² Fagan and Provan.—"The Effect of Manures on the Nitrogen and Mineral Content of Upland and Lowland Pastures." (1930.) Welsh Plant Breeding Station, Series H, No. 11, 29.
- ³ Woodman, Blunt and Stewart.—"Nutritive Value of Pasture." (1927.) *Jour. Agric. Sci.*, 17, 210.
- ⁴ Woodman and Evans.—"Nutritive Value of Pasture." (1930.) *Jour. Agric. Sci.*, 20, 615.

THE TREATMENT OF NARCISSUS BULBS WITH HOT WATER

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THE standard treatment for daffodil bulbs affected by eelworms is to immerse them for three hours in water heated to a temperature of 110° F. This treatment has generally been found unsatisfactory by reason of the destruction or distortion of the flower during the season after treatment. Such damage to the bulb can, to some extent, be met by treating the bulbs at exactly the right time of year, but it is not easy to discover the critical time for every variety, while there are practical difficulties in arranging that large quantities of bulbs, grown on a commercial scale, should all be dealt with at the ideal period, which may only last for a week or so. It was, therefore, decided to investigate afresh the principles underlying the hot-water treatment, to ascertain whether modifications could not be introduced in order to eliminate flower-damage.

The main points upon which accurate and detailed information seemed to be needed were: (1) the time required to kill the eelworms when subjected to various temperatures, and (2) the time taken for bulbs of different sizes to heat to the centre to various temperatures. On neither point are

HOT-WATER TREATMENT OF NARCISSUS BULBS

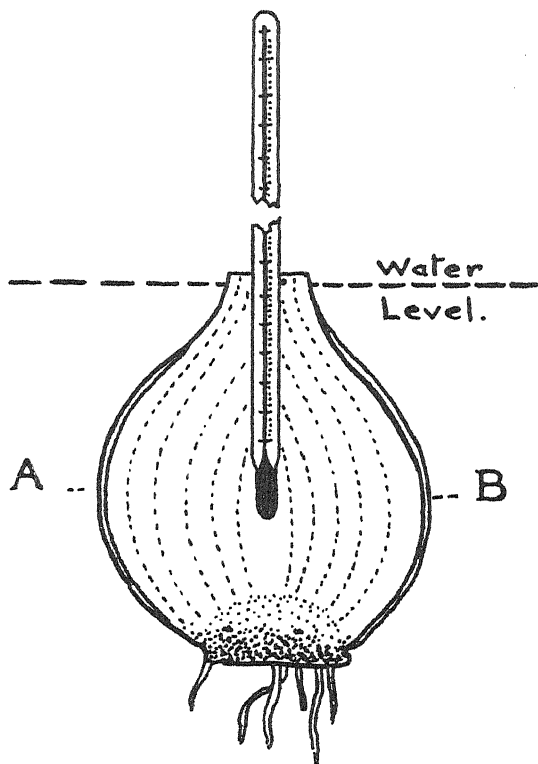


FIG. 1.—Diagram showing method of inserting thermometer in bulb and the position of the bulb in the water during heating.

the investigations of Ramsbottom¹ and subsequent workers² sufficient. A full account of the experiments will be published elsewhere, but this paper is a preliminary note for the information of growers who wish to consider the subject before the next treating season. As, for practical purposes, the temperature of 110° F. is that of greatest importance, only the results relating to this temperature will be set out here.

Method of Recording the Heating of Bulbs.—Fig. 1 shows, in diagrammatic form, the method of inserting the thermometer into the centre of the bulb. A hole was bored in the bulb by means of a cork borer, appreciably smaller in diameter than the thermometer. The thermometer, of small diameter, was forced into the bulb, thus preventing water from entering the hole, and the neck of the bulb was kept just above water level. The depth to which the hole was bored into the bulb was determined by measurement. After each determination, the bulb was cut open,

HOT-WATER TREATMENT OF NARCISSUS BULBS

and the result was accepted or rejected according as the thermometer had or had not penetrated correctly.

Determinations were also made by means of an electric thermocouple and it was found that the thermometer gave a somewhat longer reading. Having regard to the fact that this constituted an extra safety factor from the point of view of killing eelworm, and that the thermometer was easier and quicker to use, the bulk of the determinations were made by this means.

The water was kept at a constant temperature in a small bath by means of a gas jet controlled by a thermostat.

Measurement of Bulbs.—Three measurements (in millimetres) were taken of each bulb before treatment, viz.:—(1) the length from the nose to the base plate; (2) the *greatest* diameter in the region of the greatest circumference; and (3) the *least diameter* in the region of the greatest circumference. **EXAMPLE:** Measurement (1) was 79 mm., measurement (2) was 54 mm., and measurement (3) was 49 mm. To put these measurements in a compact form they are written as measurement 1 (measurement 2 \times measurement 3) or, in the example given above, 79 (54 \times 49) mm.

Various other methods, such as weighing and the determination of cubical capacity of the bulbs were tried, but the measurements given above were found most satisfactory. This aspect of the work cannot be discussed here in detail, but its importance is fully realized.

The Heating of Bulbs in Hot Water.—Fig. 2 shows the heating (water at 110° F.) and cooling (in air) curves for two bulbs of King Alfred; the two bulbs were the large and small parts of a double-nosed bulb. It will be seen, in the case of the larger bulb, that the heating is at first very rapid, the centre of the bulb reaching 108° F. in a little over 30 minutes. The rate of heating becomes less rapid until, as the temperature of the bulb approaches 110° F. (the temperature of the water), it is very slow. With the smaller bulb there is also this diminishing rate of heating, but it is far less marked. The smaller bulb is heated to 110° F. (right through to the centre) 31½ minutes before the larger bulb, the total times for the two bulbs being 18 and 49½ minutes respectively.

The cooling curves are longer for both bulbs, the smaller

HOT-WATER TREATMENT OF NARCISSUS BULBS

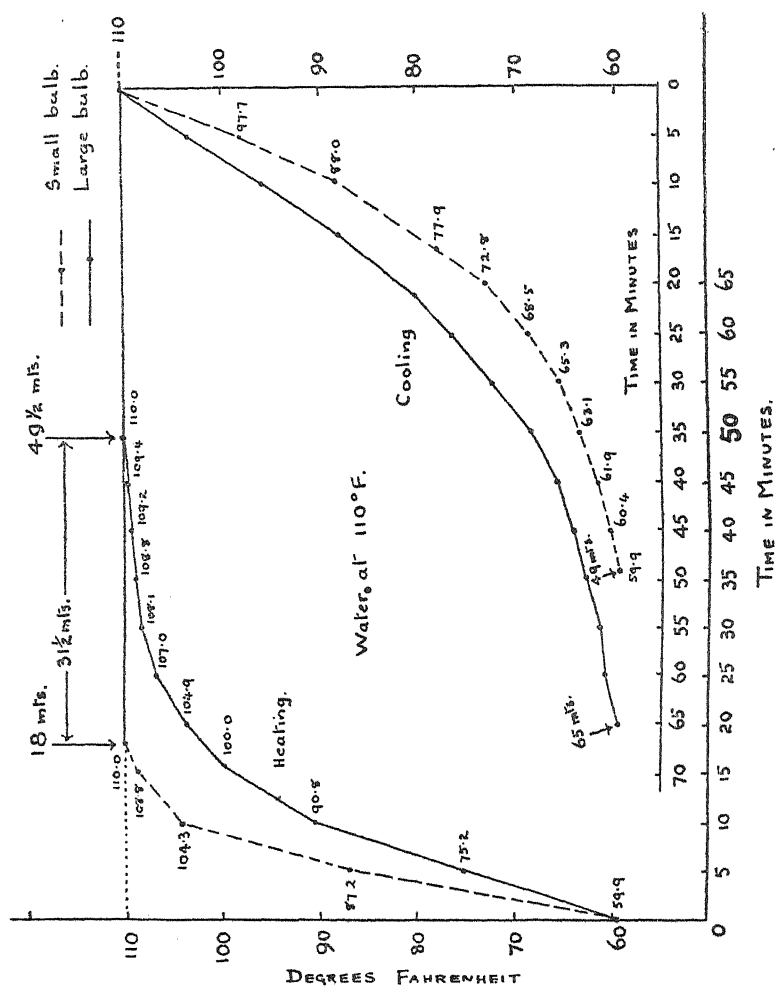


FIG. 2.—Graphs showing the heating and cooling curves for a large bulb, size 58 (43 × 40) mm.; and for a small bulb, size 51 (29 × 29) mm., to an internal temperature of 110°F. in water at 110°F. Variety: King Alfred.

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bulb cooling before the larger. There is not, however, such a great difference in the rate of cooling as in the rate of heating.

The Heating of "Double-nosed" Bulbs.—The rates of heating of double-nosed bulbs has been studied, but it is not possible here to give a full consideration of the points of importance. Broadly speaking, however, the time required for the treatment of double-nosed bulbs is indicated by the measurement of the bigger bulb of the two. When the two bulbs are closely pressed together the general measurements, considering the two bulbs as one, should be taken.

The Killing of Eelworms (*Anguillulina dipsaci*)* by Means of Hot Water.—The time taken to kill eelworms in water of different temperatures was determined by means of an apparatus devised so that the worms were suspended in water and passed into a fine capillary U-tube immersed in the hot water. The worms could be left there for varying times and then collected into cold water in watch-glasses. The worms were then kept for 72 hours; if no movement took place after this time, experience showed that they were dead. A curve for the killing of eelworms was obtained for a range of temperatures from 108° F. up to 128° F., which was found to be the thermal death point for *A. dipsaci*. (The "thermal death point" is the temperature at which eelworms are killed practically instantaneously.)

The temperature of 110° F. will be considered principally in this article.

It was found that the ease with which the worms were killed by hot water varied greatly in different individuals. Worms from bulbs were more easily killed than worms from leaf lesions as the result of new infections. Many determinations were made, and the curve was constructed from the longest times determined. The longest time for the temperature of 110° F. was 17 minutes. Ramsbottom¹ states that eelworms "took 45 minutes to die" at a temperature of 110° F. While, for various reasons, it is more difficult to determine the time accurately for eggs, the time taken to kill eggs is definitely much less than for the worms. The time taken for eggs to be killed in water

* Previously known as *Tylenchus dipsaci*.

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at 110° F. is approximately 8 minutes. This disposes of the view held by some growers that eggs might not be killed as easily as the worms.

The time of 17 minutes obtained above was that taken to kill worms in hot water. In order to see if the time was also sufficient for the killing of the worms in bulbs, determinations were made on a number of bulbs infected with eelworms. Each infected bulb had a thermometer inserted as in Fig. 1. The bulb was then placed in water at 110° F., as previously described, and the time noted at which the centre of the bulb reached 110° F. The bulb was then kept in the water for a further 17 minutes and was examined microscopically later. These experiments showed that the time of 17 minutes for killing eelworms at 110° F. applied to worms in bulb tissue as well as to those in hot water.

Larger-Scale Experiments in the Field.—In order to follow up the small-scale experiments, with bulbs affected by eelworms, that had been carried out in the laboratory, larger-scale experiments with such bulbs were also carried out. The bulbs, in this instance, were planted and allowed to flower under ordinary conditions, so as to reproduce the conditions to be found on a bulb farm, both as regards the treatment of the bulbs with hot water and their growing.

Bulbs of a number of varieties of *Narcissus* were obtained from attacked areas, the areas being noted during the growing season. The largest bulb of each sample was selected and the time taken to heat this bulb through to the centre to a temperature of 110° F. in water of the same temperature was determined. The whole of the sample was then heat-treated for that period with the addition of a period of 20 minutes. The time of 20 minutes was used as being more convenient in practice than a time of 17 minutes, and as providing an extra safety period of 3 minutes.

The bulbs were then planted out and observations made during the growing season. After flowering was finished, the bulbs were cut open and examined for eelworms in order to determine the percentage of bulbs infected and to see that all eelworms were killed. Only bulbs treated for the short periods, based on the work carried out in the laboratory, were cut open and examined. Table I summarizes the results obtained in this experiment.

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TABLE I.

Sam- ple No.	Variety	Measurements of largest bulb in sample (mm., (as previously described)	Time taken for largest bulb to heat through to 110° F. (mins.)	Total length* of treatment (Time of heating + 20 mins. for eelworm, or standard 3 hours)	Approximate time centre of largest bulb subjected to 110° F. (mins.)	Date of Treatment	Date of Planting	Per- cent- age of bulbs affected with eelworms (before treat- ment)	Results of examination of bulbs after lifting (Those treated for shortened periods "Dead eelworms" includes eggs)
1	Dick	55 (37×34)	30	50	20	Oct. 10	Oct. 27	11	Eelworms dead
2	Soleil d'Or	45 (38×38)	45	65	20	Oct. 11	Oct. 27	88	Dead eelworms, <i>Eumerus</i> larvae and bulb mites
3	Soleil d'Or	45 (38×38)	45	Standard	135	Oct. 14	Oct. 27	88	—
4	Sir Watkin	73 (50×38)	37	57	20	Oct. 14	Oct. 29	54	Dead eelworms and bulb mites
5	Ornatus	52 (32×51)	23	49	20	Oct. 16	Oct. 27	43	Dead eelworms and <i>Eumerus</i> larvae
6	Ornatus	52 (32×31)	23	Standard	157	Oct. 16	Oct. 27	43	—
7	Scilly White	60 (45×45)	46	66	20	Oct. 19	Oct. 25	30	Dead eelworms
8	Scilly White	60 (45×45)	46	Standard	134	Oct. 19	Oct. 25	30	—
9	Grand Monarque	65 (55×52)	63	83	20	Oct. 20	Oct. 25	99	Dead eelworms and <i>Eumerus</i> larvae
10	Golden Spur	70 (45×42)	59	79	20	Oct. 20	Oct. 29	22	Dead eelworms, <i>Merodon</i> and <i>Eumerus</i> larvae
11	Princes	61 (40×38)	33	53	20	Oct. 20	Oct. 27	25	Dead eelworms and <i>Merodon</i> larvae
12	Sir Watkin	61 (40×38)	33	53	20	Oct. 20	Oct. 27	48	Dead eelworms, <i>Merodon</i> and <i>Eumerus</i> larvae
13	Barri conspicuus	55 (37×34)	30	50	20	Oct. 24	Oct. 25	14	Dead eelworms
14	Emperor	63 (49×49)	45	65	20	Oct. 24	Oct. 27	90	Dead eelworms

* Total length of treatment commenced from the time when the water in the tank regained 110°F. Treatments were carried out in a small electrically-heated bath.

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TABLE II.

Sample No.	Variety	Hot-water treatment (110° F.) and date. Time of heating of bulb + 20 min. (short), or standard (3 hr.) see Table I		Notes on flowers
1	Dick	Short	Oct. 10	Normal
2	Soleil d'Or	Short	Oct. 11	Mostly normal. A few with slight perianth notches. Normal <i>Scilly White</i> rogues
3	Soleil d'Or	<i>Standard</i>	Oct. 14	Badly notched and split or blind
4	Sir Watkin	Short	Oct. 14	Normal. Normal <i>King Alfred</i> rogues
5	Ornatus	Short	Oct. 16	Mostly flowered. Bulk of flowers normal, some with slight notching. Normal <i>Barri</i> rogues
6	Ornatus	<i>Standard</i>	Oct. 16	Very few flowers, mostly notched, some blind
7	Scilly White	Short	Oct. 19	Mostly normal, a few with slight notching
8	Scilly White	<i>Standard</i>	Oct. 19	Some normal. Some with split perianth and cups
9	Grand Monarch	Short	Oct. 20	Normal
10	Golden Spur	Short	Oct. 20	Normal. Normal <i>Fire Vail</i> rogues.
11	Princeps	Short	Oct. 20	Normal. Normal <i>Sir Watkin</i> rogues.
12	Sir Watkin	Short	Oct. 20	Normal. Normal <i>Princeps</i> and <i>Spur</i> rogues
13	Barri conspicuus	Short	Oct. 24	Normal
14	Emperor	Short	Oct. 24	Normal. Normal <i>Sir Watkin</i> rogues

The bulbs treated for short periods exhibited leaf damage, such as speckling and mottling, to about the same degree as those treated for the standard period (3 hours).

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Owing to the large proportion of bulbs, used in the above experiment, that were affected by eelworms, mites, and the larvæ of the Narcissus Flies, the number of flowers produced was variable; many bulbs were much weakened. Table II, however, summarizes the observations made on the condition of the flowers. It is of interest to note the normal type of flower produced by bulbs treated for the shortened periods.

Experiments with *Ornatus Maximus*.—It being well known that the early Poeticus, *Ornatus maximus*, is particularly susceptible to flower injury by hot-water treatment, separate experiments were carried out with this variety. The bulbs used were "rounds"; several of the largest rounds were found to take 23 minutes to heat through to 110° F. in water at the same temperature. Allowing the addition of 17 minutes to this time, the minimum time for treating the bulbs to kill eelworm was 40 minutes. Some bulbs were treated for this period, others for 45 minutes, and further samples for the standard (3-hour) treatment. The total length of treatment commenced from the time when the water in the tank regained 110° F. Treatments were carried out at four periods during August, all the bulbs being planted on the same day (September 14). Table III summarizes the results obtained.

TABLE III.

Sample No.	Date Treated	<i>Treatment 110°F.</i>	Percentage of bulbs giving flowers
		Short (Time of heating, 20 min.) Standard (3 hours)	
1	Aug. 2	Short (45 min.)	100
2	Aug. 2	Standard + 20 min. (3 hr. 20 min.)	0
3	Aug. 2	Standard (3 hr.)	0
4	Aug. 9	Standard (3 hr.)	5
5	Aug. 9	Short (45 min.)	80
6	Aug. 16	Standard (3 hr.)	34
7	Aug. 16	Short (40 min.)	90
8	Aug. 25	Standard (3 hr.)	85
9	Aug. 25	Short (40 min.)	90
10	—	Control (untreated)	93

The optimum date for the treatment of this variety for the standard 3 hours is August 25, those treated on

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August 16 giving appreciably more flowers than the earlier treated sample, which gave practically no flowers. Of the untreated bulbs, only 93 per cent. produced flowers, but the samples were small (mostly of 20 bulbs) so that the figures must not be compared too closely. As to the quality of the flowers, there was no noticeable difference between those from the samples treated for the short period and those in the control (untreated sample). Slight notching of the perianth segments was present in all the samples, including the controls, and was clearly not directly connected with the hot-water treatments. Where bulbs were given the standard (3-hour) treatments, the flowers were good when they were present; the damage took the form of absence of flower and flower stem. A marked feature of the experiment was the earliness of the flowers in the case of the early short-time treatments. For example, in the case of the bulbs in Sample I (Table III) half the flowers were picked on April 3, a third of the total number on April 4, and the last flower on April 7. In sample 10 (untreated), the first flower was picked on April 3 and the last on April 14. The largest number of flowers picked on one day was a quarter of the total number, and they were picked on April 5. On no other day did more than a sixth of the total crop of flowers come to maturity. The flowers were not picked from any of the samples until fully open.

Figs. 3, 4, and 5 illustrate the principal points of the experiment. The advanced state of the flowers in Sample 1 may be compared with those of Sample 10 and with the absence of flowers in Sample 3.

Time Taken in the Heating of Bulbs of Different Varieties.—Table IV forms a guide as to the length of time taken by large bulbs, of many of the well-known commercial varieties, to heat through to the centre to 110° F. in water of that temperature. The minimum time for treatment in order to kill eelworm is given, together with a growers' "round figure" which allows of an additional safety period. The last column of the table is of interest. The table refers to "rounds" and "double-nosed" bulbs, the bulbs in each instance being the largest obtainable for the variety (the bulbs were all grown in the south-west of England). All the times given for length of treatment commence from the time the water in the bath regained the temperature of 110° F. It is suggested that "chips" be

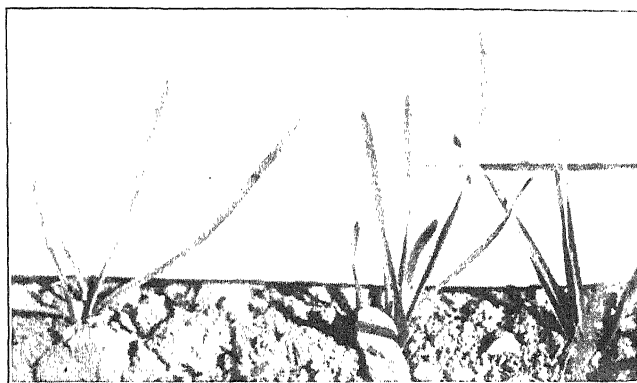


FIG. 3.—Standard treatment (3 hours at 110° F.).
Note the absence of flowers.

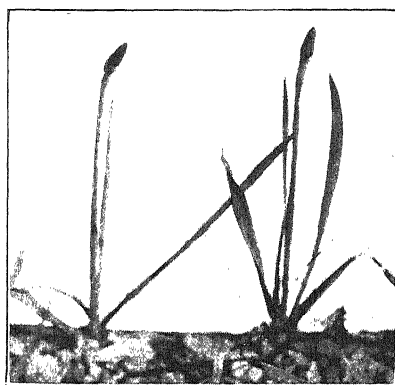


FIG. 4.—Short treatment (45 minutes at 110° F.).
Note the advanced state of the flowers.

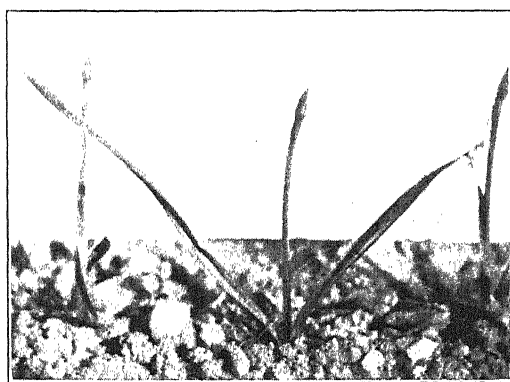


FIG. 5.—Control (untreated). Compare state of the
flowers with those in Fig. 4.

The effects of Hot Water Treatment on bulbs of the variety *Ornatus maximus*. The bulbs in Figs. 3 and 4 were treated on August 2, 1932. All the bulbs were planted on September 14, 1932, and photographed on March 23, 1933.

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TABLE IV.—" ROUNDS."

Variety	Measurements of bulb (as previously described) in millimetres	Time taken in min. to heat bulbs up to 110°F. in centre of water at 110°F. (Initial temp. of bulb, in brackets) min.	Minimum time in min. of treatment to kill eelworm (Time of heating + 17 min.) min.	Convenient round figure for length of treatment with addition of safety period hr.	Unnecessary excess time of treatment had 3 hours been given min.
Barri conspicuus	55 (37 x 34)	27 (58°)	44	1	136
Cheerfulness	50 (40 x 37)	26 (60°)	43	1	137
Ganocure	58 (39 x 38)	28 (61°)	45	1	135
Double White	51 (28 x 27)	19 (59°)	36	1 1/2	144
Emperor	63 (49 x 49)	45 (58°)	62	1 1/2	118
Empress	59 (42 x 42)	38 (58°)	55	1 1/2	125
Flame	53 (41 x 40)	29 (57°)	46	1	134
Glory of Lisse	41 (32 x 30)	31 (57°)	48	1	132
Golden Spur	68 (47 x 39)	33 (57°)	50	1	130
Grand Monarque	65 (55 x 52)	63 (65°)	80	1 1/2	100
Horace	62 (40 x 40)	29 (57°)	46	1	134
King Alfred	69 (49 x 46)	41 (57°)	58	1 1/2	122
Lucifer	60 (40 x 37)	27 (60°)	44	1	136
M. J. Berkeley	60 (42 x 38)	34 (61°)	51	1	129
Mme. de Graaff	53 (40 x 38)	28 (60°)	45	1	135
Obvallaris	48 (42 x 37)	29 (59°)	46	1	134
Ornatius	52 (32 x 31)	23 (60°)	40	1 1/2	140
Ornatius maximus	38 (32 x 30)	23 (68°)	40	1 1/2	140
Primo	70 (53 x 52)	49 (58°)	66	1 1/2	114
Principes	61 (40 x 38)	33 (61°)	50	1	130
Recurvus	60 (32 x 31)	24 (60°)	41	1 1/2	139
Selly White	60 (45 x 45)	46 (67°)	63	1 1/2	117
Sir Watkin	65 (45 x 42)	44 (58°)	61	1 1/2	110
Soleil d'Or	45 (38 x 38)	45 (67°)	62	1 1/2	118
Victoria	60 (47 x 46)	39 (57°)	56	1 1/2	124
EXAMPLES OF " DOUBLE-NOSED " BULBS (TIMES OF HEATING ARE FOR THE LARGER HALVES, MEASUREMENTS ARE FOR THE WHOLE BULBS).					
Golden Spur	51 (45 x 38)	68 (66°)	85	1 1/2	95
Golden Spur	76 (57 x 51)	75 (63°)	92	1 1/2	88
Grand Monarque	76 (70 x 64)	150 (69°)	167	3 (standard)	13
King Alfred	64 (64 x 51)	103 (65°)	120	2 1/2	60
King Alfred	70 (63 x 45)	54 (59°)	71	1 1/2	109
Sir Watkin	57 (51 x 45)	61 (67°)	78	1 1/2	102
Victoria	51 (54 x 51)	70 (66°)	87	1 1/2	93

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treated as though they were rounds with a diameter equal to the greatest diameter of the "chips."

Warning.—The experiments just described were carried out partly with laboratory apparatus and partly with an ordinary commercial "sterilizing" plant. It would not appear, therefore, that conditions in the commercial hot-water apparatus would so differ from those obtaining in the laboratory as to affect the results. Nevertheless, it must not be forgotten that, in large "sterilizers," the water in all parts of the tank may not reach the temperature of 110° F. simultaneously, and that the water in some parts may even cool off during the treatment without being detected. In such circumstances, it is of course impossible to calculate accurately the time of treatment required, and the conclusions in this paper are only applicable to apparatus that is functioning properly, i.e., when the water *throughout* the tank remains at 110° F. for the period of treatment.

Summary and Conclusions.—The following is a summary of the principal points of importance arising out of the portion of the work dealt with briefly in this article.

1. The rate and manner in which bulbs heat through to the centre to 110° F. in water of that temperature is described. The time taken to heat through bulbs of different varieties, ranging from large "rounds" of small-bulbed varieties, like *Ornatus*, to "double-nosed" bulbs of such large-bulbed varieties as *Grand Monarque*, varies from 23-150 minutes.

2. "Double-nosed" bulbs may behave, as regards heating, as two separate bulbs or as one, according to type.

3. The time taken to kill eelworms and their eggs at 110° F. has been determined as 17 minutes. The thermal (practically instantaneous) death-point is 128° F.

4. The minimum times for treatment for large "rounds" of different varieties ranges from 40 to 80 minutes. The minimum times for treatment of "double-nosed" bulbs of some of the larger-bulbed varieties are shown to range from 85 to 167 minutes.

Such periods of treatment satisfactorily control mites, and the larvæ of *Narcissus Flies* (*Eumerus* and *Merodon*).

5. Standard (3-hour) treatments will only rarely be necessary.

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6. The work, as far as it has gone, shows that, as long as bulbs are not given appreciably longer treatment than is necessary to kill eelworms and their eggs, flower damage practically disappears and the safe period for treatment is greatly extended. Shortened periods of treatment do not, however, appear to reduce leaf damage, such as speckling and mottling.

7. It is of interest to point out that there are various factors in the work which act as "safety factors," thus showing that there is no danger of failure to kill eelworms as the result of leaving too small a margin for safety. These safety factors are:—

- (a) All periods of treatment commence from the time when the water in the bath regains 110° F. At this time the centre of the bulbs has been heated through a considerable portion of the temperature range, since heating commences as soon as the bulbs are placed in the bath.
- (b) The times of heating of the bulbs have been determined by means of a thermometer, which gives a reading a little in excess of the true time.
- (c) The length of treatment is based on the size of the largest bulb in the sample. The "safety factors" are therefore further increased for the majority of the bulbs in that sample.
- (d) For practical purposes, the time taken to kill eelworms at a temperature of 110° F. is taken as 20 minutes (this being a more convenient figure than 17 minutes) thus allowing 3 minutes extra.
- (e) The time taken to kill eelworms was determined in experiments on worms removed from leaf infections (or "spickles"); worms from this source were found to be more resistant to heat than those taken from the bulbs themselves.

Other aspects of the problem have been investigated but will be dealt with elsewhere.

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- ² Gibson, G. W.—"The Control of the Narcissus Eelworm." *This JOURNAL*, **33**, No. 6, Sept., 1926, pp. 531-544.

WHAT TRADE AGREEMENTS MEAN TO THE FARMER

The following talk to farmers was broadcast by the Minister of Agriculture on May 17:—

To talk to farmers at this time of the evening on the radio is to talk to a quarter or possibly half of the farmers in the land. What is said now is thought over and discussed for days and it may be for weeks to come. I know that; I know it very well. I know it all the better because of the postbag which every day brings to the Ministry buildings in London letters in sheaves from end to end of our country. Some of our correspondents have questions, some of them have grievances, and many are simply anxious to let us know what the countryside thinks, and what its fears and hopes are, and how keenly and eagerly it is watching for any signs of improvement and how heart-sick it becomes at any sign or even any rumour that things are going wrong. I know that; I know it very well. You ask me if I realize to the full the straits and difficulties of the farming community at this time. Not perhaps as keenly as all of you, for though my father was a farmer, and my grandfather a farmer, and most of my friends and half of my relations are farmers, and I am a farmer too, when I can escape from London, yet in the streets and in the offices it may very well be that we lose touch with the actual living countryside. That is exactly what these talks are for, not only that I can get in touch with you but that you can get in touch with me.

Of course, the easiest way to get in touch would be for me to come and call: and I am sure that if I did so, and came into any farmyard or stood leaning on the gate of any field, you would say to me, after commenting on the awful cold I have, which you probably hear even now—" Mr. Minister, what do you think prices are going to be like this year? " and secondly, " Mr. Minister, what do you think about these Trade Agreements? "

These questions can scarcely be separated. What I am to talk about is the Trade Agreements and what they mean to the British farmer. You have to link that up with world trade and world prospects.

In the first place, why do we have to have any Trade Agreements at all? Especially, why do we have to have Trade Agreements that make provision for the admission

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of foreign goods to our country? The answer is simple. We have to buy because we want to sell. We have to have Trade Agreements because we have to have trade, and though this Island is the greatest market in the world for agricultural produce, it is so because of the towns—and the towns in Lancashire and in South Wales and in the Midlands, in Scotland and in Ireland, live not only by what they make and sell at home, but by what they make and sell abroad.

Now, as you know, the amount of goods that we have been able to sell abroad has diminished a good deal in the years since the War. Furthermore, even when the goods have been sold abroad, it has often been very difficult to get the money home, so that they might almost as well not have been sold at all. It is to deal with these difficulties that the Government concluded first the Ottawa Agreements last year, and secondly, the Agreements with Denmark and Argentina and Norway and Sweden that have just been signed.

That is the first answer to the question: What do the Trade Agreements mean to the British farmer? They mean and they must mean better trade, and better trade is as much a necessity for the farmer as it is for the townsman. Unless the miner is hewing coal, unless the riveter is driving rivets, unless the workers in the iron trades are handling iron and steel, they will eat and drink less bread and beef, cheese, milk and eggs, and they will not even be able to afford a glass of the new beer.

But, you will say, what about my other question, what about the prices, and where is the townsman going to get all this stuff from? It is no advantage to us in the countryside if the townsman gets busy and spends all his money abroad; it is no advantage to us if shops sell butter at a price that pays no one to make it, eggs at 11*d.* per score, bacon and mutton and lamb at a price which scarcely pays a man to take a beast to the market.

It is true, and ever since it came into office the Government has kept in view first that the greater share of the food we eat should be drawn from our own farms, and secondly that a level of prices which would not mean ruin to the home producer should be secured. That means control of foreign imports, and the Government is pledged up to the hilt to that control, and if you like I give you that pledge here again to-night. We are adopting whatever

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method is suitable in each case—it may be tariffs, or it may be quotas—and in the case of the articles which are covered by the trade pacts, to which I am chiefly referring to-night, we have chosen the method of restriction by quantity, which for short, is called “quota.” I am not concerned with arguing the case for that at any length to-night: we are simply discussing the trade pacts. I will only recall the statement of the National Farmers’ Union published this month on this very point. They say:—

“ . . . the N.F.U. sees no reason to depart from the view which it has always taken—namely, that where the safeguarding of agricultural interests is concerned, it would be folly to concentrate upon one particular remedy to the exclusion of all others, and in present circumstances, when currency manipulation is being employed on all sides to neutralize tariff imposts, the Union realizes the actual and potential value of quantitative regulation of imports as a measure for the defence of the economic interests of British agriculture.”

That means, if you want to regulate by quantities, good and well, so long as you do regulate. But first, will regulation by quantities improve the prices; and secondly, is liberty left under these Agreements to control these quantities, to cut them down if necessary? Are our hands free or have we tied them in advance before we ever get down to the work to which we have all so much looked forward? Well, these questions I am going to answer. I do not think it can be denied that if you limit the quantities you can raise the prices. It is delicate work and difficult work. You have to be careful that you do not raise the prices so as to put foodstuffs out of people’s reach and thereby actually defeat your own ends. You have to look out for changes in fashion and changes in taste. You have to look out for the change from the big joint to the small joint; from families which used to eat a big Sunday dinner at home and now go into the countryside with a thermos flask and a packet of sandwiches. But under any system you will have to look at these difficult and delicate details. You would certainly have to look at them none the less under a tariff.

Take it then that we have decided to tackle the problem in the case of half a dozen of our main foodstuff imports mainly by regulating quantities, that is to say, by the quota. In the first place, note that this frees us from all bother about the state of the Exchange. You all remember that Denmark recently broke her Exchange by 25 per cent. That was equivalent to knocking 25 per cent. off any tariffs

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that we might have against her. What she did once she could do again. The United States has just taken power to break its Exchange by 50 per cent. Broken Exchanges neutralize tariffs. They do not alter quotas. Moreover, quotas enable us to deal with prices. In the past, if the foreigner chose to pay a subsidy upon the goods he sent us or to work indefinitely long hours at indefinitely low wages, he could push down the price in this country to almost any extent. Under a quota system he can send in so much and no more. However low his price, he cannot sell another side of beef or another tin of milk. Under such circumstances he is not fool enough to try to break the market since he will get no advantage.

But, you will say, all this under the Trade Agreements and under your Marketing Bill is tied up with marketing schemes and organization at home. I think it is impossible to separate altogether control of imports from home organization. As things are at present, regulation of imports must aim at improvement of prices, and for that we must retain the support of the people in the towns. The housewife who goes to the shops in the big cities must be assured that she will get a well-organized supply of home produce. That is not quickly or easily done. It is not always inferior foreign produce from which we suffer. If we want people to buy British, we must make sure that we can deliver the goods. That takes organization and without organization we shall not succeed. Furthermore, even in the interest of the home farmer himself, organization in the present day is becoming a vital necessity. It is true it means interference. The farmer dislikes interference. I dislike it myself. Everybody dislikes it. But unpalatable although it may be, the most unpalatable thing of all is to find that the market will not buy our eggs or our milk, or that the bank will not honour our cheques. I have heard fears expressed, for instance, that the Agricultural Marketing Bill may interfere with country markets. The Bill as such does nothing of the kind. After all, what matters most to a market town is that the people who go to the market to sell, will come away with money in their pockets to spend. I don't want interference, but the first thing is to get a living.

Again, you say, if we do not have a Marketing Scheme in full working order we cannot have the control of foreign imports of which you have been talking. That is not so.

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Clause 1 of the Bill which I have in my hand states that an Order regulating the importation of any agricultural product may be made not only if a marketing scheme is in force but further if a marketing scheme has been prepared or even is in course of preparation. And when you ask me what "in course of preparation" means, I should say that it would cover the whole course of preparation of a scheme, including preliminary investigation by a Commission. It would certainly cover the case of fat stock for which, last December, I appointed a Reorganization Commission; this Commission will not report till the autumn, and a scheme could not be in force for a good many months after that. During all that time we could have home producers protected with our Marketing Bill and our regulation scheme.

Well, finally, you will say, are your hands free or do these pacts bind you so that you could not regulate imports even if all you say be true? Our hands are free. Let me read you the clause of the Danish Agreement, for instance, which covers bacon:—

Article 4 says: "The Government of the United Kingdom undertakes that the quantity of the imports of bacon and hams from Denmark shall not be less than 62 per cent. of the total permitted imports from foreign countries."

I have seen criticism in the papers saying that this gave Denmark 62 per cent. of last year's imports. It does not. Read it again. The Danish allocation "shall not be less than 62 per cent. of the total permitted imports from foreign countries." That is the total quantity of foreign imports which our Government may permit and that may be any figure we desire. Now, you say, what figure will it be. The Government has repeatedly stated its intention to reduce the total permitted imports so as to carry out the full provision of the report of the Lane-Fox Reorganization Commission on Pigs—the Lane-Fox Report—upon which the Pig and Bacon Marketing Schemes are based. I give you that assurance again to-night.

Take the case of eggs. We have not yet had a Reorganization Commission on Eggs and Poultry, though I think we shall have to have one. But even so read the clause of the Danish Agreement with regard to eggs: The clause says:—

"For eggs the Danish allocation shall not be less than 5½ million great hundreds, subject, however, to the understanding that if some greater reduction should be essential to secure the maintenance of a remunerative level of prices, the Government of the United King-

TRADE AGREEMENTS AND THE FARMER

dom may, after consultation with the Danish Government, subject imports of eggs from Denmark to such reduction below $5\frac{1}{2}$ million great hundreds as may be necessary to this end."

The case is slightly different with butter. In butter, Denmark is given a figure of 2,300,000 cwt., not a quantity we agree to purchase but a figure below which we agree not to restrict her in the next three years. That is because the responsible experts have calculated that an import of 400,000 tons of butter is as much as this country could consume at reasonable prices. A great proportion of this comes from Empire countries and this proportion has expanded enormously, as we all know, in recent years. In 1932 the world sent us 422,000 tons of butter; in 1933 it is estimated that the world wants to sell us over 450,000 tons of butter. Our reckoning is that the market cannot stand more than 400,000 tons of butter; and this figure for Denmark, which is $13\frac{1}{2}$ per cent. cut on her present rate of importation, corresponds to a reasonable allocation of that amount.

For cream, there is no limitation of our freedom of action at all. For tinned milk, there is no limitation in our freedom of action at all. On both of these, as you may have seen, I called the foreign countries together last week and said that we must have an immediate and substantial reduction of the quantities which were being sent. I hope to have definite news on that to give you before this month is out.

I want you to keep all these things in mind when you are voting on your bacon scheme under the Marketing Act, for it has to be confirmed by you directly on a vote; and when you are voting on the Milk Scheme, which also has to be confirmed by you, the producers, directly on your vote. Do not believe those who tell you that they will be wrecked by foreign imports. If you adopt these schemes it is our business and our responsibility to see that they are not wrecked by foreign imports, and we accept that responsibility. Widespread confusion may be caused if the farmers, by faint-heartedness or distrust, reject either of these schemes formulated with such care and difficulty, and throw themselves back into the welter and muddle from which they are trying to emerge.

Now we come to the question of meat. Meat, of course, is not much affected by the Danish Agreements except indirectly, because, of course, when bacon is at throw-away

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prices it is correspondingly more difficult to sell beef, mutton or lamb. Meat prices are particularly a source of anxiety to every farmer, and all of us at the Ministry know of the crash in prices that threatened last autumn, and that we only just managed to stave off. There are two criticisms one hears on that: the first criticism that prices for home meat have continued to tumble in spite of the restriction put on last autumn; the second, by restricting Argentine supplies we have put millions of pounds into the Argentine meat firms' pockets. Whatever may be said about beef, there is no question that we have been able to secure a rise of prices in mutton and lamb. The figures show that on Smithfield Market here in London, English and Scottish mutton is realizing $9\frac{1}{2}d.$ a lb. as against $6d.$ last November, and pork is up too.

But take beef itself. English beef last autumn was fetching $6d.$ a lb.; now it is about $7d.$ Chilled beef is where it was.

You may say that these are not the figures at your local market. I am simply giving the average for this country as a whole, and these are figures which I think can be maintained. But you say, "Whether the prices have risen or not does not matter to me. They have not risen enough. We cannot make a profit with beef at its present price. I am told that you have tied your hands for the whole of the next three years. Is that so?" Well, let us take the Agreement itself. The Agreement says—first, that Argentina cannot send in more chilled beef than it sent in the years 1931-32, which was 10 per cent. below the level of the five years 1927-31. We have the right to cut the level 10 per cent. below that again. That comes to 18.5 per cent. below the level of the same five years, and represents a lower figure than Argentina has sent in any year since 1920. But we have the right to cut farther than that again. The only provision is that if we cut below this quantity we must secure that some arrangement is made for all countries, the Dominions included, to share proportionately in the extra cut, and I do not think that this is unfair. If, after cutting the Argentine imports to far below what they have been any time in the last seven years, with at the same time a greatly expanded import of Dominion meat—if the market is still glutted and the prices still unremunerative—then it seems to me reasonable to say that everyone supplying the market from overseas must lend a

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hand to give the home producer a chance. But that is in brief what the Argentine Agreement says, and that is all that it says.

These things mean the livelihood of all of you who are listening, and so it is, I know, hard to consider these matters in patience. I have tried to give you as straightforwardly as possible the position as it appears to us at the Ministry who have been working on these things now for well over a year. The problems of agriculture have not been solved in any country in the world, and I should be the last to claim that they have been solved here. Yet we are sure that this is the right line, and that organization at home and regulation of imports from abroad make the true key to the difficulties in which we find ourselves today. How that organization is to be effected is your business; how that regulation of imports is to be effected is my business. But the policy stands, and the policy as brought in last autumn will bring a lasting benefit to our people.

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Pigs and Bacon Marketing Schemes.—Drafts of the two schemes as modified by the Minister and the Secretary of State for Scotland were laid before both Houses of Parliament towards the end of June. The subsequent stages and the steps that should be taken by producers who wish to become registered under the schemes were indicated in the note in last month's JOURNAL. A brief outline of the schemes as modified by the Ministers is given below. Pig producers are advised to apply to the local branches of the National Farmers' Union for any further information they may require.

The foundation of the schemes is the contract which the registered pig producer may be required to make with the registered curer to supply pigs for manufacture into bacon. Sales of pigs for pork are outside the scope of the schemes.

Pig producers who do not desire to sell pigs either to the Pigs Marketing Board or to curers will be exempt from registration and from the operation of the Pigs Marketing Scheme.

The Pigs Marketing Board will have power to prescribe, after consultation with the Bacon Marketing Board, certain important terms which may appear in the contract for the sale of pigs to curers, and the contract may be conditional upon its registration and confirmation by the Pigs Marketing Board. Both the curer and the pig producer will be bound by any modification in the contract which the Board may make reducing the number of pigs proposed to be sold, unless, in the case of the curer, he can show that he would thereby suffer loss.

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The interests of small pig producers have been safeguarded by including a provision enabling the Pigs Board to prescribe the form in which contracts by groups of registered pig producers may be made.

The Pigs Board will have power to buy pigs for the purpose of providing a pool from which deficiencies in the supply of contract pigs by registered producers can be made good to the curers. They may also establish slaughterhouses and manufacture bacon, but these powers are limited to "surplus pigs," i.e., pigs which are offered for purchase to the Bacon Marketing Board at a price not more than the ruling contract price, and not bought by that Board.

Under the Bacon Scheme, a registered curer will not be allowed to sell any home-produced bacon unless it is manufactured from (1) pigs purchased from registered pig producers in accordance with the provisions of the Pigs Scheme; (2) pigs of his own production, provided he notifies the Pigs Board of the number he proposes to produce each year; and (3) imported pigs or carcasses, provided they form part of the exporting country's bacon quota. If deficiencies in the supply of a curer's contract pigs are not made up by the Pigs Board from their pool within 21 days of application, the curer can go into the open market and buy the pigs of which he is short.

Subject to the Agricultural Marketing Bill, 1933, becoming law, the Bacon Marketing Board will have the power, subject to certain reservations, to regulate the quantities of bacon that may be sold by registered curers.

Milk Marketing Scheme.—The public inquiry held by Mr. F. M. Russell Davies, K.C., into objections to the Milk Marketing Scheme, opened at the Law Courts on June 6 and closed on June 26.

Potato Marketing Scheme.—The public inquiry into objections to the Potato Marketing Scheme will be conducted by Mr. C. T. Le Quesne, K.C., the Commissioner appointed by the Minister and the Secretary of State for Scotland. The hearing will be opened in Court B, Judges' Quadrangle, Royal Courts of Justice, on July 5. It will subsequently be adjourned to Edinburgh to begin there on July 10, in order to meet the convenience of Scottish objectors.

Hops Marketing Scheme, 1932.—The first annual general meeting of registered producers under the scheme was held on May 26. In presenting the accounts, the chairman (Mr. W. J. Woolrich) commented on the favourable outcome of the first year's working. Sales of hops to March 31, 1933, had realised £1,286,425, of which sum £1,189,285 had been paid to growers. Further payments would be made which would result in growers receiving 99½ per cent. of the valuations placed upon their crops.

An election of four special members of the Board took place, and the following were elected without opposition:—

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Mr. W. J. Woolrich, the Rt. Hon. Lord Lloyd, G.C.S.I., G.C.I.E., D.S.O., the Rt. Hon. Viscount Wolmer, M.P., and Major C. M. Higgins, M.C.

Amendments to the Hops Marketing Scheme, 1932.—A number of amendments to the scheme have been formally submitted to the Minister on behalf of the Hops Marketing Board, in accordance with the procedure laid down in the scheme itself and in the Agricultural Marketing Act, 1931. A poll of registered producers resulted in an overwhelming majority in favour of the amendments, which are designed to introduce into the scheme provisions establishing a "quota system." The object is to enable the Board to deal with conditions in which the supply of hops exceeds the quantity which the Board are able to sell.

Regulation of Imports of Processed Milks.—In view of the production of increasing quantities of milk in this country surplus to the requirements of the liquid milk market, and in view also of the accumulation of unusually large stocks of processed milks in the hands of home manufacturers, proposals for the regulation of imports into the United Kingdom of cream, condensed whole milk, condensed skimmed milk and milk powder have been discussed by the Minister of Agriculture and Fisheries with representatives of the Governments of countries concerned in the export of these commodities to the United Kingdom market. As a result of these discussions, the Governments of the foreign countries mainly concerned with this trade have agreed, as an emergency measure, to limit their exports of the above-mentioned products to the United Kingdom during the three months June, July and August, to amounts not exceeding 80 per cent. of the quantities shipped in the corresponding period of 1932. Those foreign countries whose exports of processed milks to this market are comparatively small have undertaken to ensure as far as possible that their shipments remain at previous low levels. In addition, the Governments of the Dominions that have been consulted have promised to co-operate as far as they are concerned with the export of these products and will use their best endeavours to limit shipments during the period in question to the quantities shipped in the corresponding period of 1932. The arrangements are subject to a review of the market supply situation at the end of each month.

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Direct Consignment of Cattle from Farm to Abattoir.—The Ministry's experimental scheme for the direct consignment of cattle from farm to abattoir, for sale by dead weight and National Mark beef grades, was put into operation in March, 1930, when the first consignment was sent to London. The scheme was extended to Birmingham in September, 1931, and one consignment has been dealt with in Leeds. As many as 245 consignments, representing 1,960 cattle, were dealt with at these three centres up to March 31, 1933. Full particulars of the scheme are contained in Marketing Leaflet No. 27—copies of which may be obtained, free of charge, on application to the Ministry.

In order to enable producers more clearly to understand the working of this system the Ministry has given this year, in co-operation with local bodies, four demonstrations to illustrate the procedure followed. The first and second demonstrations—at Barnstaple and Hereford—were described in the March and June issues, respectively, of this JOURNAL. The third and fourth demonstrations were given at Wolverhampton on May 17 and Lincoln on May 30.

A similar procedure was followed at each demonstration. Producers who had agreed to provide cattle for the purposes of the demonstration were quoted prices by a wholesale butcher in Birmingham. On acceptance of these quotations, the cattle were slaughtered, weighed and graded locally instead of at Birmingham as would be normal. As provided in the scheme, the carcasses were paid for on the basis of the accepted quotations and according to the ascertained dead-weights and carcass-grades.

It was an important feature of the demonstration to compare this method of assessing values with that of visual appraisal. Accordingly, the live cattle were on view at the local market in the morning to enable farmers to inspect them and to form their own opinions as to their value on the hoof. Judges appointed by the Local Education Authority and the local branch of the National Farmers' Union then graded the cattle on the hoof, estimated the number of lb. (dead weight) per live cwt. at which they were likely to kill out, and assigned a market value to each animal based on prices realized that day at the local market.

In 14 animals out of 17, the number of lb. (dead weight) per live cwt. was under-estimated by the judges, the

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differences ranging up to $8\frac{1}{2}$ lb. per live cwt. A difference of only $2\frac{1}{2}$ lb. per cwt. on an animal killing-out at $10\frac{3}{4}$ cwt. amounts to 27 lb. which, at 8d. per lb., represents 18s. more than the farmer would receive for his beast by the usual method of sale.

The common tendency also was to grade the animals on the hoof lower than they were actually graded on slaughter, and also to under-estimate their value per head. In one instance, the judges valued a beast at £15 10s., its owner valued it at £17 10s., and the amount actually realized was £19 4s.

The demonstrations thus served to show that even competent judges are apt to err—usually to the detriment of the producer—in their judgment of the value of an animal. This is especially so in the case of animals that might be classed as “ Ordinary ” and that are, of course, in the majority; the errors are usually insignificant in the case of the highest and lowest classes of stock.

The scheme is one that enables the many thousands of cattle that are surplus to local requirements and come to the larger centres of population to be sent directly from farms to abattoirs where the National Mark Beef Scheme is in operation, without incurring intermediate selling charges. Moreover, there is no uncertainty as to market prices: the quotation is accepted beforehand and the certificate issued by the Ministry's grader is an independent guarantee of the dead-weight, grade, and amount realized. Further, a good feeder of cattle does not suffer the disadvantage of being quoted on the *average* yield of dead-weight for each class of cattle, but is paid on the actual yield of his own animals.

This alternative method of disposing of fat cattle deserves consideration, and the details of the scheme, contained in the leaflet referred to above, should be studied by those interested.

National Mark Fruit.—National Mark schemes for black currants, red currants, raspberries, loganberries and gooseberries are now in operation, and a further step has thus been taken in the direction of providing standard grades and packs for the whole range of fruits produced commercially in this country.

A minimum size for each berry, according to the grade, is prescribed for raspberries, loganberries and gooseberries;

MARKETING NOTES

a modification of the usual system has been necessary for currants, which are almost invariably marketed in the bunches as picked, as the size of the berries in any bunch varies.

Under the National Mark schemes for currants the contents of each container are classified according to size-ranges. Black currants are classified in four main ranges. Thus, it is a requirement of the "Selected" grade that 46 per cent. of the fruit in any container must be at least three-eighths-in. in diameter; as regards the remainder, 30 per cent. of the total contents of the container must have a minimum diameter of five-sixteenths of an inch, 20 per cent. a minimum diameter of one-fourth of an inch, while 4 per cent. may be less than one-fourth of an inch in diameter. Somewhat similar requirements apply to red currants.

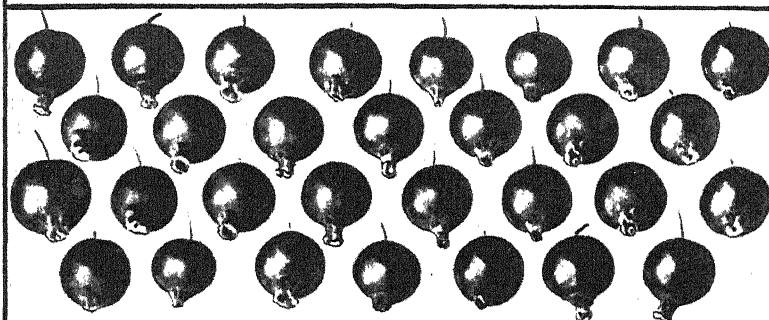
Although this definition may at first sight appear difficult to apply in practice, growers who use parallel wire frames spaced to the prescribed widths to classify a typical sample of the crop, find it a simple matter to judge whether their crop qualifies for marketing under the National Mark. The illustration shows the analysis, on the above lines, of a typical sample of graded black currants. The definition of the grade quoted above relates only to minimum sizes and there is nothing to prevent a grower from reaping the advantage of grading his fruit to a standard above that of the stated minimum if he should so desire. Where this is done, the use of the grower's name or brand in conjunction with the National Mark will enable buyers to exercise discrimination.

Although this is the first attempt made in this country to prescribe grades for black currants and red currants, growers should not hesitate to enrol in the National Mark schemes. The Ministry is prepared to arrange, as a special service during the first season, for an officer to visit any grower desirous of authorization in order to advise him as to the quality of his crop while the fruit is still on the bushes.

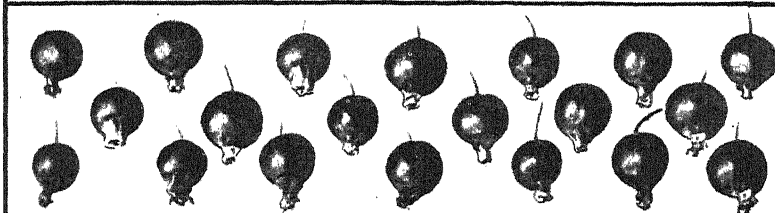
Copies of illustrated Marketing Leaflets explaining the new schemes may be obtained, free of charge, on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.



*46% not less than $\frac{3}{8}$ in. diameter.



†30% $\frac{5}{16}$ in. to $\frac{3}{8}$ in. diameter.



†20% $\frac{1}{4}$ in. to $\frac{5}{16}$ in. diameter.



†4% under $\frac{1}{4}$ in. diameter.

NOTE.—* This percentage may be exceeded.

† These percentages may not be exceeded.

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National Mark Vegetables.—The Minister has appointed a Trade Committee, consisting of the following representatives of growers and distributors:—

W. F. Bewley, Esq., D.Sc. (Chairman).

C. A. Binyon, Esq., J.P.

A. E. R. Brooks, Esq.

R. Martin Cowley, Esq., C.B.E.

A. Horberry, Esq.

R. E. Jenkinson, Esq.

Sir Wm. Lobjoit, O.B.E., J.P.

Cecil Robinson, Esq., J.P.

F. A. Secrett, Esq.

to advise the Department and the National Mark Committee regarding the administration of the National Mark schemes for fresh vegetables.

Leaflets explaining the two latest National Mark vegetables schemes introduced this year—i.e., Bunched Carrots (Marketing Leaflet No. 44) and Green Peas (Marketing Leaflet No. 45) may now be obtained, free of charge, on application to the Ministry.

The scheme for bunched carrots provides for *Selected Glasshouse* and *Selected* grades, and that for green peas for *Selected Young* and *Selected* grades. Provision is also made for packing bunched carrots in standard non-returnable containers, but in the case of the *Selected* grade the Ministry is prepared to give favourable consideration to applications to use other containers, e.g., returnable "flats."

Standard bags and containers will not at present be specified for use under the National Mark scheme for green peas, but packers applying for authorization should supply details of the bag or other container proposed to be used.

The schemes are now being demonstrated at agricultural shows and in the principal growing areas.

National Mark Wheat Flour.—Among the instances brought to the notice of the Ministry where initiative has led to a marked increase in trade turnover, is that of a flour packer who, before 1933, disposed of approximately 20 sacks of National Mark flour a month and whose efforts to induce local retailers to stock the National Mark article met with little encouragement. This packer decided to bring National Mark flour directly to the doors of householders on newly-developed estates and in rural districts in his area. Twenty-four vans, each making, on the average, 60 visits per day, were used for the purpose, and, as a result, his trade increased to the extent that 842 sacks of National

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present empowered to furnish short-term credits to individual farmers.

It is argued that, under this system, neither the maximum economy to the nation nor the maximum convenience to the farming community has been achieved. There has been duplication of administrative control, and difficulty in obtaining credits without considerable delay. The centralized organization of the new Farm Credit Administration is designed to eliminate these weaknesses.

Germany : Grading and Marking of Potatoes. —
A Ministerial Order dated December 5, 1932, provides for the establishment of the following grade designations and definitions of quality for potatoes for human consumption.

<i>Grade.</i>	<i>Kind.</i>	<i>Quality.</i>	<i>Size.</i>
Special grade	Uniform sort	Sound, clean, undamaged, of good shape	Minimum size for round sorts 4.5 cm. cross diameter; for long sorts 6 cm. length-ways diameter. The size difference between the largest and the smallest tubers may not exceed 3 cm. for round kinds, or 4 cm. for long kinds.
Commercial grade	Uniform sort or uniform in colour of flesh and skin	Sound, clean, undamaged	Minimum size for round sorts, 4 cm. cross diameter; for long sorts, 6 cm. length-ways diameter.

The Order prescribes a detailed scale of standard tolerances on account of defects, and requires that persons who sell potatoes retail under these grade designations must mark the potatoes accordingly by means of a label affixed to the containers: failure to observe this provision is punishable by a fine not exceeding 150 Marks.

JULY ON THE FARM

H. G. ROBINSON, M.Sc.,

Midland Agricultural College, Sutton Bonington.

JULY under ideal conditions provides, between hay time and harvest, a breathing space that enables one to perform a good many of those odd jobs that await a favourable opportunity. It is sometimes said that a farmer is never at a loss as to how his labour should be employed. This is truer to-day than formerly, for economic conditions have tended to curtail the labour employed to the bare minimum, with the result that there are few farms where there are no obvious jobs staring one in the face. The so-called decline in the standards of good husbandry which so many bemoan at the present time is entirely due to economic factors. One may well ask what is the point in spending money on unproductive labour at a time when there are no prospects of a sound balance sheet at the end of the farming year. Generally, the individual is the best judge of his own circumstances, but there is a danger that neglect encourages carelessness on the one hand, or is a means of storing up trouble for some years ahead.

From the purely financial standpoint it is probably desirable that there should be point and purpose in every farming activity. Good farming and good husbandry do suggest that in addition to the essentials, a general pride is taken in farming methods and appearance. Sometimes this is limited to the fields bordering on roadsides, from which the term "road-side farming" is derived, but carried to its logical conclusion it applies to the whole of farming practice. This is a very good month in which to observe the prevailing standards of husbandry. Thus far the year has been a particularly good one for the killing of weeds in root breaks, and the weather has been generally favourable for giving most crops a good start. Both factors mean that labour can be more profitably utilized, and providing hay harvest is finished some attempt can be made to get on level terms with other work.

Amongst the common routine duties of the month, thistle cutting and hedge-brushing are both important. The eradication of thistles is one of those tasks which rarely seems to be methodically pursued. It is so easy to neglect this operation, and as a last resort the thistles are cut off simply because of their unsightliness after they have gone

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to seed and when cutting at that late stage does not sufficiently exhaust the creeping root stocks to make eradication easier in future. Well-kept hedges are a productive proposition on a stock-farm, and nothing pleases the eye so well as a farm the fields of which are bordered with neat and stock-proof boundaries.

This too is a good month in which to lay in a stock of lime. Prices are cheaper than at any other period of the year, and the extensive use of motor transport now makes it possible to have this material brought direct to the farm, while the ground is usually sufficiently firm to enable the lime to be dumped in any field where it is to be subsequently applied. Last year the writer had lime applied to well-grazed-down grass fields in July and August without any injury to the subsequent growth of grass.

Grass Land in Summer.—The theoretical aspects of grassland management have received considerable attention in recent years. It was hardly necessary to remind practical agriculturists that, in the early stages of growth, grass is of higher feeding value than when it approaches maturity, though it was not recognized that the high feeding value associated with May- and early June-grown grass can be maintained if the pastures are suitably managed throughout the grazing season. Unfortunately one of the chief difficulties in the practical management of pastures is the inability to secure a uniform rate of growth and grazing control throughout the season. It has been demonstrated at many centres that the application of nitrogenous fertilizers in addition to the other manurial requirements is a means of extending the length of the grazing season, and that the system of rotational and close grazing makes it possible to check the common tendency of grasses to rush to the seeding stages.

Various snags have cropped up, however, in regard to this so-called intensive system. One of the worst arises from a tendency to over-graze, with the result that many of the best grasses are weakened only to be replaced by poorer species. This is particularly observable on grassland that has not been long established, and where the more open bottom is apt to become over-run with annual meadow grass. Seasonable variations have also to be recognized. This is specially true of many of the medium and light soils that have been laid down to grass, for on this

JULY ON THE FARM

type of land the productivity of a pasture is closely linked up with an adequate rainfall during the grazing season.

The best method of grassland management can only be determined when the full farming policy is considered together with the type of soil and climate normally experienced. There are, however, certain fundamental rules that may well be emphasized. One of the most important arises at this time of year, viz., the necessity for adequate grazing, particularly of old grass land. Adequate grazing is in part dependent on a sufficient head of stock and also on a palatable herbage. Palatability may be influenced by previous manurial treatment, and by the removal of matted turf by mechanical treatment. All these points have been abundantly demonstrated on the Midland Agricultural College farm and elsewhere. Originally, this farm was chiefly arable. The permanent grass land was unsuitable for ploughing, largely owing to drainage defects. As so often happens on arable farms, the grass land was neglected, little attention being paid to proper grazing, with the result that a matted turf developed. This land was taken in hand some five years ago, and apart from the manurial treatment, it was subjected to vigorous mechanical treatment by the use of the Wilder pitch-pole harrow. Largely as a result of the improvement effected, this land now carries over one beast to the acre throughout the grazing season, and it is found possible to prevent undue roughness of the grazing. A further asset in the management of this land has been the division of the fields into smaller areas, thus making it possible to graze-down and rest in turn, though the system in force does not depend on the use of nitrogenous top-dressings, other than in two or three cases for an early bite at the beginning of the grazing season.

The existence on grass land of tufts that so commonly develop around the droppings of cattle are an unavoidable evil. The Leicestershire grazier, who is a past-master in grassland management, used to employ labour spreading these droppings and in some cases carting them off. As a means of inducing cattle to graze these tufts of grass, the introduction of sheep is worth a trial. This is a practice that the writer originally saw on the farm of Mr. James Cruickshank, of Port Errol, Aberdeenshire. The sheep are introduced on the cattle-feeding pastures when the cattle have grazed-down bare patches. These are the most acceptable

parts of the field to the sheep, and the associated cattle are then forced to turn their attention to the coarser parts of the grazing. Observation indicates that sheep along with cattle are valuable for securing more even grazing.

The extent to which it is desirable to graze-down pastures during the summer months must have some reference to the requirements of out-wintered stock. This point is of growing importance, since the breeders of dairy cattle, for example, are paying more attention to out-wintered young stock and cows on the grounds of healthier rearing. It is necessary, therefore, that the requirements of winter "keep" should be held in view, and in these circumstances it is sound policy to graze-down each field once every two years.

Potato Spraying.—To spray or not to spray is a much debated topic amongst potato growers. The majority of specialist growers, particularly in the Fen districts, however, find it desirable to anticipate outbreaks of potato Blight and to resort to preventive spraying. The normal incidence of Blight varies greatly with the district and season. No grower can afford to risk a bad attack, so that spraying should enter into the routine practice just as much as the other operations contributing to successful crop growth. The experimental evidence as to the benefits of spraying support this conclusion, for apart from a lengthening of the growing life of the sprayed plant, there is a notable tendency to increase the proportion of sound saleable ware tubers. In the Midlands and in eastern England Blight may appear during July, for which reason it is desirable to take steps to spray crops for the first time during the month. There is an unfortunate tendency to await evidence that spraying is necessary before commencing this operation. Such a policy is risky, for it is more desirable to regard spraying as a means of prevention of this disease rather than as a cure. Hence early spraying must be stressed in relation to this problem.

The objections which are most commonly raised against spraying are usually based on the troublesome nature of the operation, and the necessity for care in the mixing of the spraying materials. These objections have now been overcome by the introduction of suitable horse-worked spraying machines and the availability of compounds ready mixed for dilution with the appropriate

quantity of water. A further development has been the introduction of very finely-powdered materials for application in the dry form, and the growing popularity of applying in the powdered form is due to the relative simplicity of the operation and the fact that it avoids the necessity for water carting. These are of considerable practical significance, though comparative tests in the past tend to favour wet spraying from the viewpoint of efficiency and lasting properties. The efficacy of dry dusting greatly depends on the choice of a suitable day, and it is usually necessary to apply in the early morning or late evening when the leaves are moist with dew. Heavy rain following spraying may destroy the protective properties by removing the powder from the leaves. There can be no hard-and-fast rules as to the frequency of spraying. In some seasons as many as six applications may be desirable, the weather being the determining factor. In the average season from two to three applications are necessary, at intervals of about three weeks.

Utilization of Surplus Milk.—Among the summer problems of the dairy farmer is that of finding a profitable market for surplus milk. One of the most promising developments in many districts is the conversion of such milk into soft cheeses, and numerous cases are on record where it has been possible to build up a very remunerative trade. The Cambridge cheese is one of the most popular types for this purpose, since it can be cut into small portions. Three quarts of milk will produce a Cambridge cheese that can be sold wholesale for 1s. Coulommier cheese is also a good type, the three to the gallon of milk size being sold wholesale at from 6d. to 8d. each. The demand for these soft cheeses usually extends from April to October, and it is an interesting point that during recent years the demand for this type has increased when they have been made small. It was formerly customary to make two cheeses per gallon of milk, but the demand is now for the three, and in some instances four, to the gallon size. Another factor that counts in marketing is the manner in which such cheeses are packed, and this should always receive special attention. The cost of packing is often an appreciable item, suitable boxes for despatch by post costing as much as 1d. each. In the absence of boxes, these cheeses are best packed in good parchment grease-proof

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paper, which adds much to the appearance of the product. The name and address of the maker printed on the paper or on an attached label is good business and is a means of ensuring continuity of orders.

Soft cheese-making, however, is a purely seasonal business, and for general purposes there is a good demand for Gervais cheese and also for rennetted cream cheese.

The cream trade has suffered a setback as a result of the competition from home cream-making machines, which utilize milk and unsalted imported butter. It is very probable that the price charged for cream on the retail market has served to diminish the demand. In Nottinghamshire, Lincolnshire and Yorkshire a certain demand exists for curd made from surplus separated milk, where it is purchased by bakers for making curd tarts. About $1\frac{1}{4}$ lb. of curd are obtained from one gallon of such milk, the curd commanding a price of $5d.$ to $6d.$ per lb. Ice cream, too, offers possibilities in districts where a retail trade can be engaged in, and since the more general extension of electricity, the problem of ice and freezing is more or less solved.

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Feeding of Sheep in Relation to Production Costs.—

In pre-war days the folding of sheep on the lighter soils was considered to be the basis of good farming, but in addition to being the foundation on which the whole farming system was built up, the maintenance of an arable land flock was in itself generally profitable. It has been stated that it was possible to budget with reasonable safety upon a profit of £1 per ewe on large flocks of 1,000 Down ewes. Economic conditions have changed all that, and at the moment sheep farmers are anxiously examining their methods and costs in relation to returns, with the object of finding some way of making ends meet.

Where a breeding flock is kept, the proceeds from the sale of lambs and cast ewes must cover the year's cost of

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feeding the ewe flock, depreciation, labour and other charges. Figures have been published by several Departments of Agricultural Economics to show the cost of lamb and mutton production, and although these figures may differ in certain details they are generally consistent in showing that the more completely the ewe and her progeny are kept on grass land, the lower is the cost of production; whereas the longer the portion of the year that she spends on arable land, and the more concentrated food that she consumes, the higher the production costs mount up. The cost of keeping the ewe is not much greater when she rears twins than when she rears but a single lamb. In other words, the more lambs reared per 100 ewes, the lower will be the figure arrived at for the cost per lamb, when the total cost of keeping the ewes is divided by the number of lambs reared. For example, if the cost of keeping 100 ewes is £175, as it may be on grass when the cost of grazing is put at 3*d.* to 4*d.* per week, and the number of lambs reared is 150, the average cost per lamb is 23*s.* 4*d.*; but if the number of lambs is 125 then the cost per lamb would be 28*s.* If singles only are reared the cost would be 35*s.* each. These figures may not be strictly accurate or absolutely correct proportionately, but they serve to illustrate the point that the first step of importance in commercial production is to secure ewes which, being prolific and good mothers, are capable of rearing a large crop of lambs.

At the bottom of the scale, we have relatively low costs where the ewe flock is kept on grass with little or no extra feeding. At the other end, there is the type of sheep farming, of which an illustration is given by Lee in the *Farm Economist*, April, 1933. In this instance a flock of Hampshire ewes was kept during the winter on kale, swedes, and sugar-beet tops, close folded, followed in spring by vetches. In the summer and autumn the flock lived mainly on the aftermath of seeds and grass, with roots thrown out in the latter part of the season. Concentrates and hay were fed at certain times. The area of arable land crops consumed per head of the ewe flock amounted to about $\frac{1}{4}$ acre, made up of kale, vetches, and mangolds, plus one-seventh acre of sugar-beet tops, or some 39 acres or more, of plough land crops per 100 ewes, at a cost of about 33*s.* 6*d.* per ewe. The concentrated foods consumed were valued at 8*s.* 9*d.* and hay at 7*s.* per ewe. The output of lambs was only 100 per cent., and over a period of five

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years, it was reckoned that there was an annual loss of nearly £1 per ewe.

One agrees with Lee that this is a serious deficit, and the main reasons for such a deficit would appear to be the extensive use of arable land crops and hay—25 acres plus sugar-beet tops, per 100 ewes—coupled with a low output of lambs, and high depreciation. The striking feature of this case is as one would expect, namely, that fat lamb production cannot pay at present prices where anything like the area of arable land crops mentioned, is employed.

In a B.B.C. talk, Futchcr stated that for fat lamb production, he allows some 15 acres of arable land crops per 100 ewes. He caters specially for the early market, and has practically an all-the-year-round trade for fat lambs, which he sells at 34 to 38 lb. dead weight. From his Hampshire ewes he obtained an output of $1\frac{1}{4}$ lambs per ewe, but he did not state what size of lamb crop he secured from the Dorset Horn ewes, which he employs for out-of-season lamb breeding. His figure for arable crops is interesting in that it is less than half that in the case quoted by Lee, but again it is much higher than the allowances provided under farming conditions in the Midlands.

Dorset Horn ewes, for out-of-season lamb, are now kept as an important sideline on Northamptonshire farms. They are maintained mostly on permanent or temporary grass, generally with some small provision of arable land crops, usually kale, for use during the bare months, January to March. On the average, the area of arable land crops allowed, is about 1 acre to 20 or 25 ewes, or about 4 acres per 100 ewes, that is to say less than one-third of that allowed by Futchcr, and somewhere in the neighbourhood of one-tenth of that employed in the example described by Lee. Hay and concentrated foods are given as necessary.

The point one wishes to make from the foregoing statement is that in order to cut costs, so that these are, to some extent, commensurate with the prices obtainable for the product in the shape of fat lamb, it is advisable to review very carefully any methods that involve extensive use of arable land crops, and that it is necessary to use the produce of arable land with the strictest regard to economy. It is, of course, recognized that it is a very valuable stand-by to have some arable land crops in the early months of the year, and that there is some considerable risk of failure if early lamb production is attempted without some such pro-

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vision. On the other hand, where ewes live for the greater part of the year on the plough land, with a total provision of over 30 acres of crops per 100 ewes, there is little likelihood of profit unless prices of lambs should improve very substantially, and a demand develop, for the subsequent barley crop, at much higher prices than have been current recently.

Although it is realized that there is nothing like grass for promoting milk production, it does not appear to be fully recognized that there is possibly nothing better than poultry manure for stimulating an early bite of grass for ewes in the very early spring. As far as the writer's experience is concerned, where poultry have been run on temporary leys, either in slatted-floor houses or houses of the folding type, those leys have given the earliest and most nutritious grass for the ewe flock, to an extent replacing the need for arable crops at this time of the year. The possibility of wider application of the folding system of poultry-keeping in this direction deserves to be fully explored.

A point has recently been made that an unlimited supply of hay given to ewes in milk may have an adverse effect on milk production, and that it is better to control the quantity of hay used. Sheep farmers who have been accustomed to allow ewes as much hay as they cared to eat, have expressed some doubt as to whether this is really a point of practical importance. In a preliminary trial conducted on the County Institute farm, the figures obtained appear to indicate, significantly, that it is just as important to control the bulk of hay given to ewes, as it is to dairy cows. The importance of the milk yield of ewes is recognized as fundamental, and any points of management likely to affect milk production are worthy of care and study.

Description	Price per ton	Real value per ton	Food value per ton	equiv. per 100 lb.	per unit starch equiv.	per lb. starch equiv.	Pro- tein equiv.
Wheat, British	£ 8. 6 10	£ 8. 0 10	£ 8. 6 0	72	1 8	0.89	9.6
Barley, British feeding	5 5	0 8	4 17	71	1 4	0.71	6.2
" Canadian No. 3 Western	5 15	0 8	5 7	71	1 6	0.80	6.2
" Argentine	5 10	0 8	5 2	71	1 5	0.76	6.2
" Persian	4 17*	0 8	4 9	71	1 3	0.67	6.2
" Russian	5 08	0 8	4 12	71	1 4	0.71	6.2
Oats, English white	6 0	0 8	5 12	60	1 10	0.98	7.6
" " black and grey	6 0	0 8	5 12	60	1 10	0.98	7.6
" Scotch white	6 10	0 8	6 2	60	2 0	1.07	7.6
" Canadian No. 2 Western	6 7	0 8	5 19	60	2 0	1.07	7.6
" " No. 3	6 0	0 8	5 12	60	1 10	0.98	7.6
" " mixed feed	5 3	0 8	4 15	60	1 7	0.85	7.6
" Argentine	5 7	0 8	4 19	60	1 8	0.89	7.6
" Chilian white	7 17†	0 8	7 9	60	2 6	1.34	7.6
" Russian	5 10†	0 8	5 2	60	1 8	0.89	7.6
Maize, Argentine	4 12	0 8	4 4	78	1 1	0.58	7.6
" American	4 8†	0 8	4 0	78	1 0	0.54	7.6
" Gal. Fox	4 7†	0 8	3 19	78	1 0	0.54	7.6
" Russian	4 38	0 8	3 15	78	1 0	0.54	7.6
" South African	4 8†	0 8	4 0	78	1 0	0.54	7.6
Peas, Japanese	25 5†	0 17	24 8	69	7 1	3.79	18.1
Dari, Egyptian	6 0†	0 9	5 11	74	1 6	0.80	7.2
Milling offals—Bran, British	4 10	0 19	3 11	43	1 8	0.89	9.9
" " broad	4 17	0 19	3 18	43	1 10	0.98	10
Middlings, fine imported	5 0	0 14	4 6	69	1 3	0.67	12.1
" coarse British	4 17	0 14	4 3	56	1 6	0.80	10.7
Pollards, imported	4 10	0 18	3 12	62	1 2	0.62	11
Meal, barley	7 2	0 8	6 14	71	1 11	1.03	6.2
" " grade II	6 7	0 8	5 19	71	1 8	0.89	6.2
" maize	5 12	0 8	5 4	78	1 4	0.71	7.6
" " South African	5 7	0 8	4 19	78	1 3	0.67	7.6
" " germ	5 10	0 13	4 17	79	1 3	0.67	8.5
" locust bean	6 12	0 6	6 6	71	1 9	0.94	3.6
" bean	8 0	0 19	7 1	66	2 2	1.16	19.7
" fish	15 0	2 13	12 7	59	4 2	2.23	53
Maize, cooked flaked	5 17	0 8	5 9	84	1 4	0.71	9.2
" gluten feed	5 17	0 14	5 3	76	1 4	0.71	19.2
Linseed cake, English, 12% oil	8 17	1 3	7 14	74	2 1	1.12	24.6
" " " 9% "	8 12	1 3	7 9	74	2 0	1.07	24.6
" " " 8% "	8 7	1 3	7 4	74	1 11	1.03	24.6
" " " Indian 7% "	7 15†	1 3	6 12	74	1 9	0.94	24.6
Soya-bean cake, 5½% oil	7 17†	1 12	6 5	69	1 10	0.98	36.9
Cottonseed cake—English, Eryp- tian seed, 4½% oil	6 2	1 3	4 19	42	2 4	1.25	17.3
" " English, Indian seed, 4% oil	6 08	1 3	4 17	42	2 4	1.25	17.3
" " Egyptian, 4½% oil	5 12	1 3	4 9	42	2 1	1.12	17.3
" " decorticated 7% "	7 5†	1 13	5 12	68	1 8	0.89	34.6
" " meal, decorticated 7% "	7 5†	1 13	5 12	68	1 8	0.89	34.6
Coconut cake, 6% oil	6 5†	1 0	5 5	77	1 4	0.71	16.4
Ground-nut cake, 6-7% oil	6 17	1 1	5 16	57	2 0	1.07	27.3
" " decor. 6-7% oil	7 17	1 11	6 6	73	1 9	0.94	41.3
Palm-kernel cake, 4½-5½% oil	6 0†	0 13	5 7	73	1 6	0.80	16.9
" " " meal, 4½% oil	6 0†	0 13	5 7	73	1 6	0.80	16.9
" " " meal, 1-2% oil	5 10	0 14	4 16	71	1 4	0.71	16.5
Feeding treacle	5 0	0 9	4 11	51	1 9	0.94	2.7
Brewers' grains, dried ale	4 0	0 14	3 6	48	1 5	0.76	12.5
" " " porter	3 12	0 14	2 18	48	1 3	0.67	12.5
Dried sugar-beet pulp (a)	5 5	0 7	4 18	66	1 6	0.80	5.2

* At Bristol. † At Liverpool. § At Hull. (a) Carriage paid in 4 ton lots.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, and are otherwise stated, and refer to the price ex mill or store. The prices were current at the end of May, 1923, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £20 per ton, then since its manurial value is 23s. per ton as shown above, the food value per ton is £8 17s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.29d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculation a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets.

FARM VALUES OF FEEDING STUFFS

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent Per cent.</i>	<i>Protein equivalent Per cent.</i>	<i>Per ton £ s.</i>
Barley (imported)	71	6.2	5 6
Maize	78	7.6	4 8
Decorticated ground-nut cake ..	73	41.3	7 17
" cotton cake ..	68	34.7	7 5

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.26 shillings, and per unit protein equivalent, 1.90 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1932, issue of the Ministry's JOURNAL, p. 781.)

FARM VALUES.

CROP	Starch equivalent	Protein equivalent	Food value per ton, on farm	
	Per cent.	Per cent.	£	s.
Wheat	72	9.6	5	9
Oats	60	7.6	4	10
Barley	71	6.2	5	1
Potatoes	18	0.8	1	4
Swedes	7	0.7	0	10
Mangolds	7	0.4	0	10
Beans	66	19.7	6	1
Good meadow hay	37	4.6	2	15
Good oat straw	20	0.9	1	7
Good clover hay	38	7.0	3	1
Vetch and oat silage	13	1.6	0	19
Barley straw	23	0.7	1	10
Wheat straw	13	0.1	0	17
Bean straw	23	1.7	1	12

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

MISCELLANEOUS NOTES

PRICES OF ARTIFICIAL MANURES

Description	Average price per ton during week ended June 14th				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 8 16d	£ 8 16d	£ 8 16d	£ 8 16d	s. d. 11 4
„ „ Granulated (N. 16%) ..	8 16d	8 16d	8 16d	8 16d	11 0
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 10d	6 10d	6 10d	6 10d	6 4
Calcium cyanamide (N. 20.6%) ..	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 10	3 5	3 2	3 7g	4 9
Potash salts (Pot. 30%) ..	5 13	5 10	5 7	5 11g	3 8
„ „ (Pot. 20%) ..	4 1	3 17	3 14	3 19g	3 11
Muriate of potash (Pot. 50%) ..	10 9	10 2	9 15	10 5g	4 1
Sulphate „ „ (Pot. 48%) ..	12 5	12 0	11 15	12 3g	5 1
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%)d ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	3 2	..	3 4	2 16k	3 6
„ „ (S.P.A. 13½%) ..	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	6 10	6 5	6 7f	6 7	..
Steamed bone-flour (N. 3½%, P.A. 27½-29½%) ..	5 15	5 7	5 2f	5 2	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness: 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, and for lots of 10 cwt. and under 1 ton 15s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE May general index of the prices of agricultural produce at 102 was 3 points lower than in April and 13 points below the figure recorded in May, 1932. The decreases in the average prices of fat cattle and milk were mainly responsible for the fall in the general index.

MISCELLANEOUS NOTES

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13=100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	102
June	153	140	131	123	111	—
July	145	141	134	121	106	—
August	144	152	135	121	105	—
September	144	152	142	120	104	—
October	139	142	129	113	100	—
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—Wheat at an average of 5s. 7d. per cwt. was 5d. dearer than in April and the index rose by 3 points to 71. The average for barley also was 3d. higher at 6s. 6d. per cwt. and the relative index increased by 3 points to 85. Oats, however, fell by 1d. per cwt. to 5s. 8d. and the index by 5 points to 76. Wheat and barley were not far short of the levels reached in May, 1932, but oats were nearly 30 per cent. cheaper.

Live Stock.—A slight decline in prices of fat cattle was recorded throughout May, whereas it is usual for prices to rise a little in that month; the index, therefore, showed a fall of 3 points to 3 per cent. below pre-war. Fat sheep also were cheaper but in this case the decrease was in accordance with the usual seasonal trend and was less severe than in May, 1911-13, so that the index appreciated 4 points to 120. Bacon pigs fell by 7d. and pork pigs by 1s. per score, and in both instances the index was lower. Store cattle and sheep maintained about the same prices as in April and the indices show no alteration but store pigs were cheaper by approximately 2s. per head and dairy cows by nearly £1. The index for the former declined 11 points to 112 and for the latter by 5 points to 101.

Dairy and Poultry Produce.—Milk contract prices for May have generally fallen below those ruling in April and resulted in a decline of 15 points in the index to 138; at the corresponding period last year the index fell by 13 points to 137. Butter has cheapened by about 1½d. per lb., and the index at 85 is the lowest recorded since 1905. The average price for cheese was practically unchanged on the month but, as there was a fall in May of the base years, the index showed a rise of 4 points.

MISCELLANEOUS NOTES

Eggs have continued to sell at prices below the pre-war level, but on the whole the average for May has been a little higher than for April. The increase in the corresponding period of the base years was, however, proportionately greater, and the index, therefore, was 1 point lower at 92.

Other Commodities.—Potatoes became dearer during the early part of May, and although prices have since declined, the average for the month was higher than in April and the index rose by 10 points to 97. Clover hay was a little dearer and the index for hay advanced 2 points to 68. Wool was unaltered at 38 per cent. below pre-war.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity.	1931.	1932.	1933.			
	May	May	Feb.	Mar.	Apr.	May
Wheat	72	77	71	69	68	71
Barley	90	93	84	79	82	85
Oats	89	107	85	84	81	76
Fat cattle	119	120	107	105	100	97
„ sheep... ..	140	107	106	112	116	120
Bacon pigs	121	103	98	110	112	107
Pork „	133	106	109	118	116	107
Dairy cows	124	118	111	109	106	101
Store cattle	125	115	107	103	99	99
„ sheep	128	89	82	85	84	84
„ pigs	152	100	117	122	123	112
Eggs	107	97	117	101	93	92
Poultry	163	136	122	129	124	132
Milk	147	137	150	129	153	138
Butter	108	108	100	93	91	85
Cheese	122	143	113	110	111	115
Potatoes	185	245	113	106	87	97
Hay	90	70	65	66	66	68
Wool	79	67	63	62	62	62

Syllabus of Lectures in Agricultural Meteorology

ONE of the resolutions passed by the Conference of Empire Meteorologists, 1929 (Agricultural Section) was in the following terms:—

“ 20. Instruction in the methods and results of agricultural meteorological research should form a more important part of the curriculum than is the case at present at University Departments of Agriculture, Agricultural Colleges and Farm Schools.”

The Agricultural Meteorological Committee of Great Britain (acting for the Ministry, the Department of Agriculture for Scotland, the Forestry Commission, and the

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Meteorological Office of the Air Ministry) has given considerable attention to this matter, and has drawn up an outline syllabus, "Suggestions for a Course of Lectures on the Outlines of the Study of Crops in Relation to Weather." This syllabus has been distributed to University Departments of Agriculture, Agricultural Colleges and similar institutions, both at home and in the Empire.

Agricultural Machinery Testing Committee

THE undermentioned certificates and reports, issued by the Ministry, have been published in pamphlet form:—

No. 45. "Gascoigne Milk Equaliser," submitted for test by the manufacturers, Messrs. Gascoignes (Reading) Ltd., Gascoigne House, Great Knollys Street, Reading. (Price 3*d.* net, post free 3½*d.*)

No. 46. "Dunlop Pneumatic Tyres, Wheels and Hubs for Farm Carts," submitted for test by the manufacturers, the Dunlop Rubber Co., Ltd., Fort Dunlop, Erdington, Birmingham. (Price, 3*d.* net, post free 3½*d.*)

Copies of these pamphlets may be obtained, at the prices stated, through any bookseller, or direct from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C.2.

Enforcement of Minimum Rates of Wages.—During the month ending June 14, legal proceedings were taken against five employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
Hereford...	Bromyard	£ s. d. 15 0	£ s. d. 1 1 0	£ s. d. 10 0 0	3
do. ...	do.	15 0	1 1 0	10 0 0	3
Kesteven & Lindsey	Caistor ...	1 0 0	—	*1 9 9	2
Yorks, E.R.	Hull ...	2 2 0	10 6	12 0 0	1
Pembroke & Cardigan	Aberystwyth	2 0 0	2 2 0	8 9 2	1
		£6 12 0	4 14 6	41 18 11	10

Foot-and-Mouth Disease.—No case of Foot-and-Mouth disease has occurred in Great Britain since May 26, 1933, and, at the time this issue went to press, no part of the country was subject to Foot-and-Mouth Disease (Infected Area) Restrictions.

* In the case of one worker, the magistrates reserved their decision.

NOTICES OF BOOKS

Roses of Quality. By Charles H. Rigg. Pp. 94. Illustrated. (London: Ernest Benn, Ltd. 1933. Price 6s.)

This book, written by a Vice-President of the National Rose Society, gives, with cultivation notes, a list of the modern roses that, by general consent, are the most desirable sorts to grow. Particulars are also given of the most beautiful and interesting kinds suitable for the private garden. Mr. Rigg is not only a great lover of roses but a great collector and grower (both in London and the country) of different species of roses from all parts of the world. His book, illustrated by fine colour-plates of such varieties as *Julien Potin*, *W. E. Chaplin*, *Rose Berkeley* and *Mrs. Samuel McCredy*, will be a fascinating volume for the many who are interested in this popular flower and its cultivation.

Land Drainage in Britain. By B. W. Adkin. Pp. xi + 542, and 78 Figs. (London: The Estates Gazette, Ltd., 33-35, Kirby Street, Charles Street, Hatton Garden, E.C.1. 1933. Price 15s. 6d.)

The importance of drainage has been recognized throughout the centuries, as the history of the reclamation of the Lincolnshire and Cambridgeshire fens, from the days of Hereward the Wake, abundantly indicates. Land drainage is not really effective without arterial drainage, and it is sound policy that the one should be well supported by the other. We know well enough that even to-day there is widespread need for work in both directions, and we cannot know too much about ways and means.

Land agents, surveyors, and all others concerned with the management of estates—indeed, all who are interested in the great industry of agriculture—should therefore be grateful to the College of Estate Management for this excellent addition to its series of text-books. The volume generally deals with the various branches and methods of land or field drainage, as distinct from arterial drainage; the improvement of rivers and the prevention of floods; the various means of draining lowlands by gravitation, syphons, pumps and the like; irrigation and water meadows; legislation; and other matters. There seems to be little, if anything, that is omitted, and it is a great advantage to have so much relative information and guidance within one cover.

It is perhaps only natural that somewhat too little attention should be paid to land drainage in its relationship to arterial drainage, but nevertheless the author has dealt concisely with the Land Drainage Act, 1930 (which is printed as an appendix to the volume), together with all the regulations issued in connexion with it up to the beginning of 1933.

It is well that all should realize that, however effectively under-drainage may be carried out, it is only of minimum value unless ditches, watercourses and main rivers are properly maintained, for it is by these that the surplus water must ultimately get away to the sea.

The volume is a thoroughly good text-book, packed with information, and well illustrated, although a second edition might well be improved by the addition of some first-class photographs. Considerations of cost may have compelled the omission of photographs—of which many exist—showing the congested state of some of our main rivers.

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Outbreak of Fowl Cholera in Norfolk and Suffolk

DURING the past month the Ministry has received reports of the existence of Fowl Cholera among ducks in the counties of Norfolk and Suffolk. The identification of the disease has been confirmed at the Ministry's Veterinary Laboratory.

While there is no suggestion that the disease is transmissible to human beings, Fowl Cholera affects all the domesticated species of poultry.

According to the information obtained in the course of a recent inquiry, the outbreak referred to is chiefly confined to the duck-fattening localities, and has been responsible for a heavy mortality among ducks on certain farms. In some instances, the disease has extended to fowls.

It appears that the disease has been spread to a considerable extent within the two counties mentioned by the disposal through local markets of apparently healthy ducks and geese from infected farms, and in view of this the Local Authorities of Norfolk and Suffolk have advised special steps for the disinfection, after every sale, of the pens or receptacles in which birds have been kept or exposed for sale.

The Ministry recommends that the following steps should be adopted to protect healthy flocks against the risks of introduction of this disease by birds coming from these counties:—

1. For the time being, special care should be exercised in the introduction of live birds to poultry farms.
2. Such poultry should be purchased direct from healthy flocks.
3. Every newly-purchased lot of birds should be strictly isolated and specially supervised for 14 days. It should be remembered that all species of poultry may contract the disease. This isolation and supervision

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should, therefore, be adopted in respect of fowls, ducks, geese and turkeys.

In the event of unusual mortality among birds on a poultry farm, the owner should take immediate steps to ascertain the cause.

For purposes of diagnosis, one or two recently-dead birds should be despatched to a Laboratory and, if fowl cholera is diagnosed, the owner should be guided by the advice given by the Laboratory as to the measures to be taken for the control of the disease. Where an owner is in doubt he should consult the County Poultry Instructor on the matter and as to existing facilities for Laboratory diagnosis.

A leaflet on Fowl Cholera (Advisory Leaflet No. 19) has been issued by the Ministry, and a copy will be sent post free on application to: The Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Insect Pests of Crops, 1928-31

THE Ministry has now published a Report* on Insect Pests of Crops in England and Wales for the years 1928-31, being the seventh report in the series dealing with the incidence of insect and other invertebrate pests that are harmful to farm, fruit and garden crops.

The main body of the Report deals with the prevalence of pests of economic importance, and for convenience these are divided into sections, such as pests of cereals, potatoes, fruit, etc. As regards fruit insects, it is noted that the Capsid Bug, the most injurious insect pest of the apple, continues to spread, and that the Apple Sawfly was perhaps only second to the Capsid in the extent of losses caused to the commercial apple grower. Generally speaking, the Report is not primarily concerned with control measures, although these are alluded to where opportune, but an important chapter is included on developments in methods of control. The markedly increased interest in dusting as opposed to spraying is commented upon, but it is pointed out that many difficulties remain to be overcome before dusts supplant sprays. Progress made with winter-spray fluids, pyrethrum and derris in connexion with the Raspberry Beetle, naphthalene, etc., is also reviewed. Another interesting chapter deals with foreign introductions, such as the Apple Fruit Fly, *Chrysanthemum Midge*, etc., and the measures taken to ensure their control or eradication. In

*Bulletin No. 66, *Insect Pests of Crops, 1928-31*. Obtainable through any bookseller or from H.M. Stationery Office, price 1s. (post free 1s. 2d.).

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this connexion, the warning is given that ornamental or garden plants, especially those of a bulbous or tuberous type, have been found most likely to introduce potentially dangerous species of insects. A note is also given on that beneficial introduction, the Woolly Aphis parasite. The publication closes with a list of references to papers that were published in Great Britain and Ireland during 1928-31, concerned with subjects dealt with in the Report.

Dairy Produce Supplies, 1932

THE review of *Dairy Produce Supplies in 1932*,* compiled by the Empire Marketing Board on similar lines to the first review (for 1931), issued in June last year, brings together, in readily accessible form, a mass of useful statistics, most of which have already appeared in the well-known *Weekly Dairy Produce Notes*. As a result, however, of recent legislative developments, the scope of the present volume has been considerably extended, additional information being included relating to import duties, imports of live pigs, and the production of and trade in Canadian cheese. There is, also, a more comprehensive and detailed statement of the Continental trade in butter and cheese, and the final section is devoted to a summary of wholesale prices from 1926 to 1932.

The predominant position occupied by the United Kingdom in the international dairy produce trade is of great importance to this country and to our overseas suppliers. Imports of milk, poultry and pig products, in 1932, accounted for 30 per cent. of the value of our total imports of food, drink and tobacco; and the value of butter imported was greater than that of any other food commodity. Last year, the United Kingdom purchased three-quarters of the quantity of butter offered in the international market, and was, at the same time, the only large-scale buyer of bacon.

On the basis of quantity, the United Kingdom, in 1932, purchased more butter than in 1931, and, with an allowance for home production, *per capita* consumption rose from 20.9 lb. to 21.8 lb. Imports of cheese also increased, but those of other milk products were reduced. Eggs suffered a severe decline, but egg products remained practically unchanged. Imports of poultry, both live and dead, were on a smaller scale than in the previous year. Bacon imports

*E.M.B.66. Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London W.C.2, price 1s. (post free 1s. 3d.).

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reached the record figure of 11.4 million cwt., but imports of other pig products, which are of less significance, were not so large as during 1931. Although the gross quantity of produce exceeded that for 1931, the fall in values reduced the aggregate cost of all these foods by £18,000,000. Practically all dairy products averaged a lower price for the year, English and New Zealand cheese being the only products that exceeded the average value of the preceding twelve months.

The interest now being taken in the import situation and its effects on the home market for milk products, bacon and eggs, makes the publication of this report particularly opportune. It will constitute the experts' *vade mecum* for the next twelve months.

Poultry and Rabbit Conferences

THE 17th annual Poultry Conference and the 5th annual Rabbit Conference, organized by the Harper Adams Agricultural College and the National Institute of Poultry Husbandry, will be held at the Harper Adams College during the present month, the Poultry Conference from Tuesday, August 15 to Thursday, August 17, and the Rabbit Conference on Friday, August 18.

The Poultry Conference will open on the afternoon of August 15, when papers on duck feeding and management will be read by Mr. T. Hedges and Miss M. S. Miller, B.Sc. In the evening, Dr. A. W. Greenwood, of the Edinburgh Institute of Animal Genetics, will give some "Observations on Egg Production." The morning session, on August 16, will be taken up by a discussion on rearing methods, in which Messrs. F. Bowers, J. Meekings and Y. Watanabe will take part. The rest of the second day will be devoted to disease questions, the lecturers being Major T. Dalling, M.R.C.V.S., Dr. H. P. Bayon, Mr. H. P. Hamilton, B.V.Sc., and Professor E. A. Seagar, M.B., Ch.B., D.T.M. & H. Mr. Tom Newman will open the proceedings on the last day with a paper detailing the breeder's part in poultry disease control. The rest of the morning session will be occupied with papers on "Systems of Farm Poultry Management" contributed by Mr. A. Arbuthnot, Mr. C. W. Hurley and Miss D. Taylor. In the afternoon, Miss K. Howard, N.D.P., and Miss M. McMurray, B.Sc., will deal with table-poultry production, the Conference concluding, at the evening session, with a discussion, to be

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opened by Mr. Eric B. Lomax, M.A., N.D.P., on "Problems of Present-day Poultry Breeding Practice."

A demonstration of rabbit-fur glove-making, by Mr. and Mrs. E. Dallow, on the afternoon of August 17, will be a prelude to the Rabbit Conference on August 18, when there will be contests for Angora wool and for fur pelts, the respective judges being Mrs. M. Matthews and Mr. T. Leaver. During the morning, papers will be read on "Studies of Fur Types and Coat Growth in Rabbits" (by Dr. J. N. Pickard); "The Business Side of Angora Keeping" (by Mr. G. Lenthall); and "Experimental Work on Table Rabbit Production" (by Squadron-Leader Graham Weir). The Judges will deliver their comments on the Wool and Fur Contests in the afternoon, after which Mr. K. D. Downham, B.V.Sc., D.V.H., will read a paper on the "Prevention and Control of Some Rabbit Diseases," the Conference concluding with an inspection of the Rabbit Department at the College.

Applications for particulars of the Conferences, tickets, accommodation, etc., should be addressed to the Principal, Harper Adams Agricultural College, Newport, Salop.

The Celery Fly

THE early brood of the Celery Fly appears to be prevalent this season in many districts, and a heavy attack on celery and parsnips may therefore be anticipated in late summer.

As is well known, the grubs of the fly tunnel in the leaves, causing blister-like patches: attacked leaves soon shrivel up, and when the attack is severe the foliage may be almost entirely destroyed. In consequence the celery stems cannot grow properly and are small, green and bitter: when parsnips are seriously attacked only small roots are formed.

Celery and parsnip plants should be examined now, and where signs of damage are seen measures should be taken to prevent serious loss later in the season. In small gardens some good may be done by removing and burning leaves that contain grubs, but this is impracticable when large numbers of plants are grown. Chemical deterrents have given good results if applied frequently (about every week or ten days) at the time when the flies are laying their eggs—that is, from the end of July to the beginning of September. A mixture of three parts of soot to one part of slaked lime,

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or a paraffin emulsion (paraffin 2 pints, soft soap 1 lb., water 10 gal.) might be tried in this way. Spraying with a nicotine wash to destroy the grubs in the leaves is also worth a trial but here again repeated applications at weekly intervals would be necessary: 1 oz of pure nicotine* and $\frac{1}{2}$ lb. of soft soap in 10 gal. of soft water should be used. Applications of nitrate of soda, to force rapid growth, will help the plants to withstand a moderate attack, provided they are not suffering from lack of water.

Young Farmers' Clubs : International Dairy Cattle Judging Competition

THE 12th annual International Dairy Cattle Contest organized by the National Federation of Young Farmers' Clubs was held at the Royal Agricultural Show at Derby on July 5, 1933. Teams representing Northern Ireland, Wales and England took part. Mr. Robert Hobbs, Professor Robert Rae and Professor J. A. S. Watson again acted as Judges.

A very close contest, followed with interest by many spectators, resulted in the team representing England winning the *Daily Mail* Gold Challenge Cup by the narrow margin of 10 points. The best individual score was recorded by John Askin, of Northern Ireland.

The full scores were as follows:—

Teams. (Maximum 2,160.)

1. England	..	..	..	..	1,625
2. Northern Ireland	..	..	..	..	1,615
3. Wales	..	..	..	..	1,410

Individual Scores. (Maximum 720.)

1. John Askin (N. Ireland)	..	..	..	595
2. Irene Peart (England)	..	..	..	560
3. Nancy Moralee (England)	..	..	..	535
4. { William Jones (N. Ireland)	..	..	..	530
James Moore (England)	..	..	..
6. William McKee (N. Ireland)	..	..	..	490
7. Kenneth Williams (Wales)	..	..	..	480
8. { Joseph Conolly (Wales)	..	..	..	465
Roy Lewis (Wales)	..	..	..

The *Daily Mail* again awarded silver medals to the members of the winning team and bronze medals to members of the team occupying second place. The Royal Agricultural Society awarded a certificate to each competitor.

* *Caution.*—Nicotine, especially when undiluted, is a dangerous poison and must be used with great care. Stocks of nicotine should be kept under lock and key and handled only by responsible persons.

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After the contest, the Judges announced the order in which they had placed the cattle in the various rings and explained the points which they had taken into consideration in arriving at their decisions. They also paid tribute to the high standard attained by the competitors.

The awards were presented by the President of the Society, His Grace the Duke of Devonshire, K.G.

World's Poultry Congress, 1933

THE British National Exhibit for the World's Poultry Congress at Rome next month (September 6 to 15) is now nearing completion. The Congress will be housed in the Market Place of Trajan in the old Imperial City, and the fourth floor of the ancient building has been allotted to foreign national exhibits, the British display being accommodated in three of its massive vaulted chambers.

The aim of the British National Exhibit, which has been designed by Captain G. W. Spencer, of the Ministry, the staging being planned by Captain J. S. Lee, A.R.I.B.A., Superintending Architect to the Ministry, is to emphasize the excellence of British poultry stock and the sound organization of the poultry industry in this country. The central display will direct attention to the four most popular commercial utility breeds—Rhode Island Red, Light Sussex, White Leghorn and White Wyandotte. Carefully selected specimens of each breed have been stuffed and mounted on a turntable which, revolving round a large globe, symbolizes the United Kingdom's export of poultry to all parts of the world. On a decorative panel in the background is a statement of national poultry activities, state-aided and voluntary. The other walls of this central chamber are devoted to statistical information on the growth and expansion of British poultry production.

The two other chambers are allocated, respectively, to Research and Education exhibits. In the Research section, an exhibit, prepared by Professor R. C. Punnett, will illustrate some of the latest activities of the Small Animal Breeding Research Institute at Cambridge. The importance of the Silver Cambar breed for sex-linkage, and the recently-discovered sex-linked cross between a dark Runner duck and a fawn Runner drake, are particular features of this exhibit. Another Research exhibit illustrates experiments, under the direction of Mr. M. S. Pease, Geneticist at the Animal Nutrition Institute, Cambridge, in the

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development of the Cambar breed to produce a commercial strain of high fecundity.

The Poultry Nutrition exhibit has been prepared by Captain E. T. Halnan, of the Animal Nutrition Institute, Cambridge, the main feature illustrating the food requirements of hens laying, respectively, 50, 150 and 250 eggs per annum. Another feature shows the effect of food upon egg colour. The Pathological exhibit is concerned with the production and use of the new vaccine treatment for fowl-pox, and has been arranged by Mr. N. Dobson, of the Ministry's Veterinary Laboratory, Weybridge.

In the Education section, an exhibit, prepared by the National Poultry Institute, includes a general survey of the instructional and experimental work at the more important centres. There is also a model display of the lay-out of plant at the various institutes, and a statement of the duties of a county poultry instructor, set out on a decorative wall panel. Another exhibit deals with egg-laying trials and emphasizes the value of the "copper ring" marking and of the register of records.

An exhibit, prepared by the National Rabbit Council, comprises specimens of Angora wool and of pelts of the various fur breeds of rabbits, together with a display of garments, etc., made from them.

International Conference of Agricultural Economists

THE 3rd International Conference of Agricultural Economists will be held this month (August 20 to August 27, 1933), at Bad Eilsen, in the State of Schaumburg-Lippe, Western Germany. The First Conference was held at Dartington Hall, Devon, 1929, and the Second Conference at Cornell University, Ithaca, New York, in 1930.

Many well-known economists will take part and the programme includes discussions on:—

"The World Agricultural Situation."

"Agriculture in Germany."

"International Credit and Monetary Factors (Debts, Reparations, Loans, Interest), and their influence upon Agricultural Prices."

"Over-production, Under-consumption and Unemployment."

"Policy of International Trade in Agricultural Products."

"Large-scale and Family Farming."

"Market Production or Self-sufficiency?"

"Co-operative Marketing and Organisation."

"The Farm and the Farm Family as Social Institutions."

"State Collectivist and Supervised Farming."

A week's extensive tour of eastern Germany will precede the Conference and another tour of western and southern Germany will follow the Conference.

THE PIGS AND BACON MARKETING SCHEMES

ON July 5, 1933, the Ministry of Agriculture and Fisheries and the Secretary of State for Scotland issued Orders* approving two schemes under the Agricultural Marketing Act, 1931, for regulating respectively the marketing of pigs and bacon produced in Great Britain. The schemes accordingly came into force on July 6. They now await the taking of polls of registered producers, in accordance with the Act, on the question whether they are to continue in force. The present is therefore an opportune moment to review the schemes and their bearing upon the policy of the Government with regard to the bacon industry.

(i) **The Reorganization Commission.**—The schemes were submitted last January by the National Farmers' Union, representing pig producers, and the Food Manufacturers' Federation, representing bacon curers. They followed the publication, in the previous October, of the Report of the Reorganization Commission for Pigs and Pig Products (the Lane-Fox Commission) and were based in their main essentials upon that Commission's recommendations.

The procedure suggested by the Commission, for securing the expansion of the home pig industry, may be briefly summarized as the stabilization of total supplies of bacon on the United Kingdom market, the establishment, for bacon pigs, of a minimum price related to cost of production, the regularization of supplies of pigs to factories by means of a contract system, and the regulation of bacon imports to make room for the increased home production which should ensue when stable price conditions have been created.

The Lane-Fox plan was thus dependent on the quantitative regulation of bacon and ham supplies from all sources, both home and imported. The principle involved was the determination of a normal level of annual consumption of bacon and the maintenance of total supplies at that level. Of this quantity, the home industry was to be allowed to supply what it could undertake to produce, its undertaking for this purpose being measured by advance contracts for bacon pigs. The remainder of the basic supply was to be allotted among exporting countries. As the home bacon

* S. R. & O. 686 (Pigs). S. R. & O. 683 (Bacon).

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output expanded, imports were to be correspondingly reduced.

This plan involved action both by the Government and by the industry itself. Governmental action was required to bring about the regulation of imports. Organization on the part of the industry was necessary not only in order that it might play its part in a scheme of planned supplies, but also that it might make the most of its opportunity.

(ii) **Regulation of Imports.**—The Government accepted the Commission's programme so far as it involved action by the State. On December 19, 1932, the Minister of Agriculture and Fisheries announced in the House of Commons that the Government accepted in principle the Commission's Report and that it was prepared to take whatever steps were necessary to facilitate the establishment of a reorganized bacon industry in this country on a firm footing, to provide for its expansion within reasonable limits and to regulate imports, by arrangement or otherwise, so far as may be requisite for the purpose. An emergency plan for the regulation of foreign imports of bacon and hams was in fact brought into operation, in November, 1932, by agreement with the foreign countries concerned. The arrangements then and subsequently made have been described in this JOURNAL from time to time. Imports from foreign countries have been gradually reduced under these arrangements which, with the co-operation of the countries concerned, have worked well and secured a substantial rise in wholesale bacon prices.

(iii) **History of the Schemes.**—The representative organizations of pig producers and bacon curers in Great Britain—the National Farmers' Unions of England and Scotland and the Food Manufacturers' Federation—also endorsed the Lane-Fox plan, in so far as it called for action from them, and in January of this year submitted to the Minister the marketing schemes for pigs and bacon which are here described.

In accordance with the 1931 Act, opportunity was given for objections and representations to be made with respect to the schemes and public inquiries into the objections were held. Certain modifications of detail, with a view to increasing the efficiency of the schemes, were then made by the Minister and assented to by the promoters, and the schemes, as modified, were laid before each House of Parliament and approved.

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(iv) **Scope of the Schemes.**—The Pigs Marketing Scheme applies nominally to all pigs produced in Great Britain. In effect, however, it applies only to pigs sold for conversion into bacon, for producers who do not desire to sell pigs to curers or to the Pigs Marketing Board are exempt from the scheme. This means that while there will be no regulation of pork-pig and store-pig sales, only pig producers who are registered under the scheme will be allowed to sell pigs to a bacon curer for conversion into bacon, and, as regards such sales, the Pigs Board is given wide powers of regulation.

The Bacon Marketing Scheme applies to all bacon and hams produced in Great Britain from pigs killed and cured and carcasses cured in Great Britain. It thus covers the relatively small amount of bacon cured in this country from imported live pigs and carcasses, practically the whole of which come from the Dominions. The definition of bacon embodied in the scheme is sufficiently wide to include what is commonly known as "pickled pork." This is necessary because there appears to be no legal definition of bacon that would not include pickled pork.

No curer who is not registered under the scheme, or exempt from registration, is allowed to sell any bacon produced in Great Britain. But in order to avoid including within the scheme a large number of small butcher-curers whose output is of small account, exemption from registration and from the scope of the scheme is granted to a curer who does not employ mechanical power, provided he can, if required, show that, since November 1, 1932, he has not put into cure more than a total of 40 cwt. of bacon in any period of two months on all the premises in his occupation.

(v) **Bearing of the Schemes on the Regulation of Bacon Supplies.**—The most important of the powers of the Pigs Board is that of regulating the prices and terms of sale of pigs to curers. It is proposed to invoke this power to ensure that all sales of bacon pigs to curers shall be on contract.

The Board has power to require that contracts shall be conditional upon registration and confirmation by it and may, if it thinks fit, modify contracts between pig producers and bacon curers by reducing the number of pigs agreed to be sold.

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These powers have an important bearing on the regulation of bacon supplies. The principle has been accepted that the home contingent of bacon shall be equivalent to the quantity represented by contracts between pig producers and bacon curers plus the bacon equivalent of pigs produced by curers themselves, subject, however, to a maximum rate of increase in home output from year to year, designed to prevent over-expansion at the outset. The need for some machinery to enforce the contract method of sale universally, to record all contracts and, if need be, to limit the volume of contracts that are made will be clear. This machinery the Pig Marketing Scheme in part provides.

The powers of the Pigs Board alone, however, are not quite wide enough to secure a watertight contract system. It has no control over the activities of dealers or of producers other than those who sell direct to curers or to the Board itself. It cannot prevent non-contract sales of pigs to curers through the intermediate stage of a dealer. Here, therefore, the powers of the Bacon Board are required to fill the gap. The Bacon Marketing Scheme prohibits the sale of bacon by registered bacon producers unless it has been manufactured (a) from pigs purchased on contract from registered pig producers or from the Pigs Board itself or (b) from pigs produced by the curer himself or (c) from pigs or carcasses produced outside Great Britain. In the last instance, the bacon produced will be included in the import allocation of the country from which the pigs or carcasses were received.

If deficiencies occur in a curer's supply of contract pigs, either in respect of number, weight or quality, and if they are not made up by the Pigs Marketing Board within 21 days of application, the curer can go into the open market and buy pigs to the extent of the deficiency.

To enable home supplies of bacon to be regulated, it is essential to have machinery whereby each curer's bacon sales can be limited to a definite maximum. This machinery is provided in the Bacon Scheme which empowers the Board (if and when authorized by Act of Parliament) to determine the quantity of bacon that may be sold by any registered curer. The Agricultural Marketing Act, 1933, which recently received the Royal Assent, enables the Board to take this power.

It is not a power, however, that can be used arbitrarily or unfairly. The relevant clause in the Bacon Scheme

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embodies the principle that each curer's share of the bacon market shall, except in certain specified circumstances which need not be enumerated, be *pro rata* to the quantity of pigs bought by him under contract from registered pig producers in accordance with the Pigs Marketing Scheme.

(vi) **Contract Terms.**—(a) *Deliveries.*—Under contracts, producers will be required to undertake to deliver definite numbers of pigs in stated months. This does not imply equal deliveries in each month. The producer must merely specify his delivery programme and adhere to it. Moreover, some elasticity in deliveries will be permitted. A producer will be allowed to exceed his contract or to fall short of it by a percentage which will be specified in the contract. Provision will also be made for discharging from their liability producers who are unable to fulfil their contracts through accidents, e.g., an outbreak of disease. Contracting will be rendered easier for small producers by permitting them to make group-contracts.

The contract system will give the curer a security of raw-material supplies such as he has never before enjoyed; his raw material will be guaranteed in advance. One of the main causes of high cost, and one of the biggest obstacles to a consistent sales policy in the bacon industry of this country has been that the curer has never known from week to week what pigs would be forthcoming.

(b) *Prices.*—Under the contract system, the feeder, for his part, will have the advantage of knowing beforehand the price he will receive. The Lane-Fox Commission recommended that the contract price of bacon pigs should be such as to guarantee a producer of reasonable efficiency that at least his costs would be met. They suggested a minimum price formula which would accomplish this by relating the contract pig price to the cost of a standard ration of feeding-stuffs. The Pigs and Bacon Boards have already agreed upon a contract price basis, in respect of sales during the first contract period, which embodies this principle and indeed follows fairly closely the Commission's suggestion.

When the contract system comes into operation, every pig of standard quality sold to curers for bacon purposes will, so long as the price of an agreed ration of feeding-stuffs* stands at 7s. 6d. per cwt., be paid for at a price of

* 65	per cent.	barley meal.
25	,,	middlings.
10	,,	fish meal.

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12s. per score dead-weight. This price is for pigs at senders' station or collecting depot: the curer will pay carriage. For every 3*d.* rise or fall in the price of the ration, the price of the pig will be varied correspondingly by 3*d.* per score. Thus in whatever direction the producers' main item of cost—feeding-stuffs—happens to move, pig prices will move with it.

The Pigs Board will use its power of determination of selling prices and terms to ensure that no registered producer sells upon any other terms than those prescribed by it. National contract terms have in the past been negotiated for other agricultural commodities by representative bodies, but this will be the first instance of the agreement of contract terms to which it will be possible to secure the adherence of all producers.

The fixation of a minimum pig price based on costs of production does not mean that the pig producer has no prospect of securing a return in excess of his production costs. The Pigs Board will be in a position to negotiate a higher price level, if and when justified by bacon prices.

(vii) Control of Quality.—The control of imports will give the home producer a guarantee that that proportion of the home market which he can supply at the agreed contract price, will be, as it were, reserved for him. But if the home industry is to be given this security, it is only reasonable that steps should be taken to see that the quality of its output does not fall short of that of the imported bacon which is replaced. One of the disadvantages of the home bacon industry in the past has been the unsuitability, for bacon purposes, and the lack of uniformity of a large proportion of the pigs supplied to factories.

The Pigs Board will seek to remedy this state of affairs by enforcing the principle of payment for quality in the sale of bacon pigs. In an unorganized industry, this has not been possible. Competition for pigs has deterred individual curers from adopting the principle for fear of losing supplies.

The Pigs Board is empowered to determine the kinds, varieties and grades of pigs that may be sold and the prices at which any kind, variety, grade or quantity of pigs may be sold. It is proposed to use this power for the purpose of establishing carcass-grades for bacon pigs, of fixing price-differentials for the various grades and of

PIGS AND BACON MARKETING SCHEMES

requiring all bacon pigs sold to registered curers to be graded and paid for on a grade basis.

Grades have already been worked out for this purpose between the Pigs and Bacon Boards. There are to be 4 weight classes for bacon pigs and each of the first 3 classes is to be divided into 5 quality grades. The agreed contract price is to be payable only in respect of the middle grade of the lightest-weight class; there will be bonuses for the higher grades and deductions for the lower grades in this class. Prices for heavier-weight classes will be scaled down at agreed rates in relation to the top class. Details of the price-differentials for the various classes and grades have been given in an explanatory leaflet issued by the Pigs Board of which every pig producer known to the Board should have received a copy.

The Bacon Board is similarly empowered to determine the kinds, varieties and grades of bacon that may be sold. By virtue of this power, it would be competent for the Board, for example, to ensure an adequate supply of tank-cured bacon—an important point having regard to the fact that consumers have become accustomed to bacon of that type. The power of the Board to prescribe the manner in which bacon is to be graded and marked—which is to be exercised without interfering with the free use of private trademarks—would also enable the Board to require the use of statutory grades and the National Mark, if and when a National Mark scheme for bacon is introduced.

(viii) Other Powers.—(a) *Trading.*—The Bacon Scheme does not provide for the exercise of any trading powers by the Bacon Board. Nor is there any question of this Board controlling bacon prices.

The Pigs Board, however, is given trading powers which at first sight appear extensive. Thus, it may buy and sell pigs, and it may produce bacon, hams and other pig products. It is not, however, intended that the Board should encroach upon the sphere of the bacon curer or engage in trade to any considerable extent. The power of the Board to buy pigs is only intended to give a sales outlet to producers who find themselves unable to make a contract direct with a curer and to enable the Board to hold in reserve a small pool of pigs for the purpose of making up shortages on contracts between feeders and curers. Any pigs so bought must be offered to curers through the Bacon Board on terms not less favourable than those at which

PIGS AND BACON MARKETING SCHEMES

curers can buy pigs direct from producers. Only in the event of these pigs not being purchased by curers, can the Pigs Board sell them for pork or convert them into bacon or other products.

(b) *Non-Trading*.—Apart altogether from the regulation of sales, it is contemplated that the Pigs and Bacon Boards will carry out a number of highly important measures designed to increase the efficiency of the industry. The Pigs Board, for example, is empowered by the Pigs Marketing Scheme to “do such things as appear to be calculated to encourage co-operation among producers of pigs, or research and education in connexion with the production and marketing of pigs and commodities produced from pigs, and in particular . . . may provide or join in providing for producers the services known as ‘pig recording’ and ‘litter-testing’ and any services for similar purposes.”

The Bacon Board is similarly empowered to advertize bacon and to encourage any form of agricultural co-operation, research or education connected with the production or marketing of pigs or bacon. With the funds at their command, the Boards will clearly be in a position to do an enormous amount of valuable work in the direction of investigation, education and publicity.

(ix) *Finance*.—In accordance with the 1931 Marketing Act, the schemes provide for the raising of levies on sales of the regulated products in order to provide the respective Boards with funds. These levies cannot at the maximum be a serious burden on producers and should be far outweighed by the benefits secured by the schemes. The maximum levy under the Pigs Scheme is 1s. 6d. per pig delivered under contract (plus a registration fee of 2s. 6d. per contract) and under the Bacon Scheme, 6d. per cwt. of bacon.

(x) *Summary*.—To sum up, these schemes for the first time give to the producers of pigs and bacon the opportunity to provide for their own industrial self-government. Two things seem to be essential to the expansion of bacon production in this country—stable conditions without and efficient methods within. One is of little use without the other. These Boards have their role to play in securing the stable conditions that are necessary if development is to take place. They form part of the executive machinery of a system of regulation of supplies of bacon from all sources

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that is fundamental to the creation of stable market conditions and to the allocation to the home producer of a definite and expanding share of the home market. But, however effective their frontal attack on the maladjustments of production and distribution may be, the Boards will need and may be expected to take full advantage of their powers to raise the industry to the highest possible pitch of technical, administrative and general business efficiency, in its own and the greater public interest.

LIVE-STOCK MOVEMENTS IN THE SOUTH-WEST

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THE study of agricultural conditions in any given area is greatly assisted by a knowledge of the local marketing structure, but, unfortunately, the relevant information is not always obtainable. Devon and Cornwall are notable for the variety of their agricultural products: dairy produce, flowers and broccoli (chiefly in west Cornwall), cider apples, and barley in certain districts, small fruit in one or two sheltered localities, notably the Tamar Valley, and potato growing in the Moretonhampstead district of Devon. The live-stock markets, however, form the chief outlet for the produce of farms in these two counties, and lack of information about the movements of live stock has proved a considerable handicap in the study of local conditions. It was decided, therefore, by the Economics Department of the Seale-Hayne College, that these stock movements should be investigated. In following up the ultimate destinations of the farm live-stock, it was impossible to determine accurately the extent of the road traffic, but it was assumed that most of the animals sent over 30 miles would be rail-borne.

Accordingly, the railway companies were approached, and they granted access to the data available at the various stations, a numerical record being kept of the various classes of goods (including live stock) handled at each of them, while the records also included the respective receiving or forwarding stations. The information thus obtained disclosed, in a striking manner, the peculiarities of the markets for the four classes of stock—cattle, calves, sheep and pigs—and it may be of interest to consider these groups sepa-

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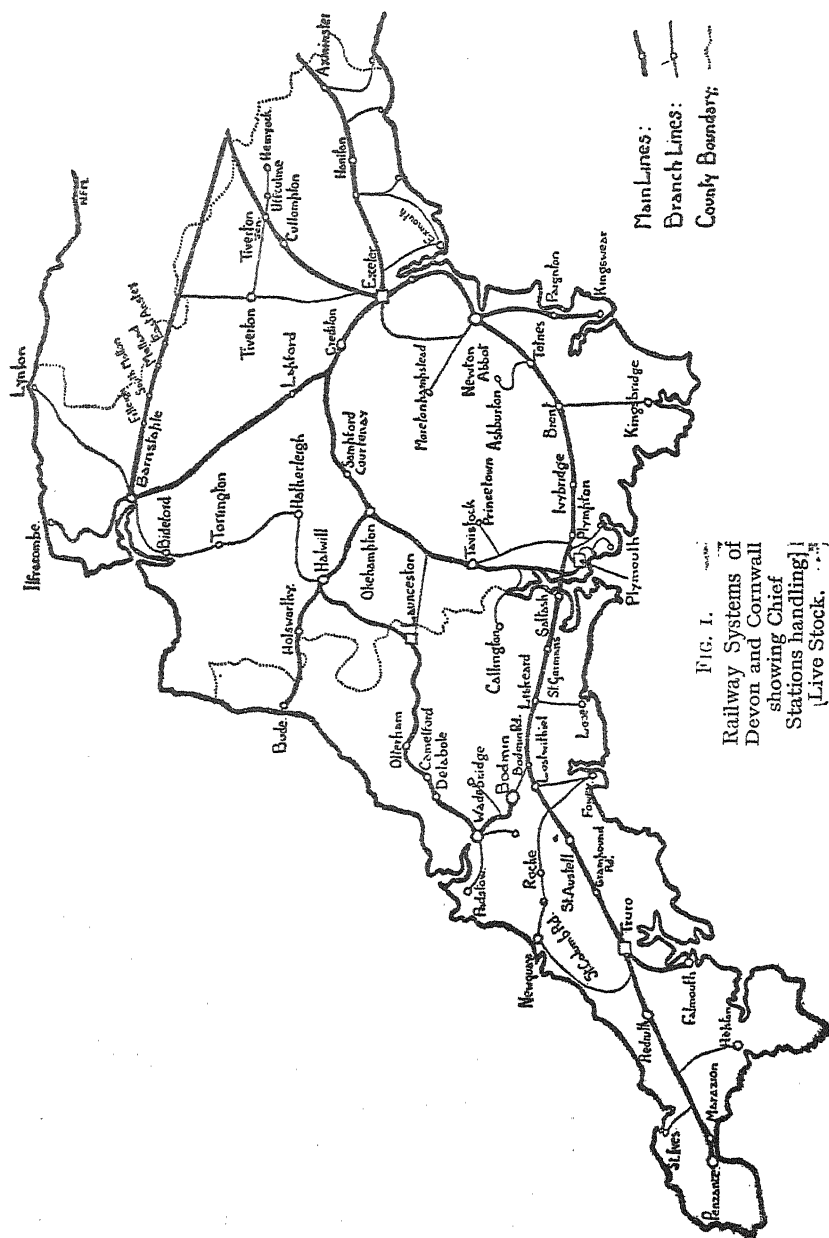


FIG. 1.
 Railway Systems of
 Devon and Cornwall
 showing Chief
 Stations handling
 Live Stock.

LIVE-STOCK MOVEMENTS IN THE SOUTH-WEST

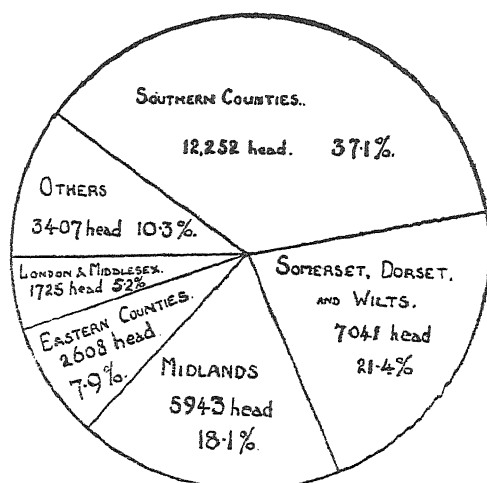


FIG. 2.—Percentage Distribution of Cattle Railed from Cornwall and Devon, 1930.

ately. Incidentally, a seasonal movement was also revealed by the figures, when these were summarized in monthly totals.

Cattle.—The figures clearly establish the fact that the south-west is an export area for cattle. Actually, more than four times as many rail-borne cattle were exported as were imported, the numbers, in round figures, being 33,000 and 7,000, respectively. The county of Sussex received most of the exports. Somerset supplied just about half the imports. The proportionate distribution of the exports in different parts of the country is shown in Fig. 2.

The supplies for the destinations indicated were not drawn from scattered sources in the two counties. It is noteworthy that the southern counties drew their supplies from north Devon and north Cornwall, while the bulk of the Midlands supply came from south Devon. Another point of interest is the difference in the system of disposal as between the north and south of the area. The weakness of the marketing structure in the north of Devon and Cornwall may be realized by a study of the map (Fig. 3) showing the distribution of markets in the southern and south-western counties. No other rural area in England and Wales has such a surfeit of small markets as north Devon and north Cornwall, and, as these markets are held at frequent intervals, the numbers of animals put up for sale are not usually large enough to attract buyers from far afield. The result is that the buying

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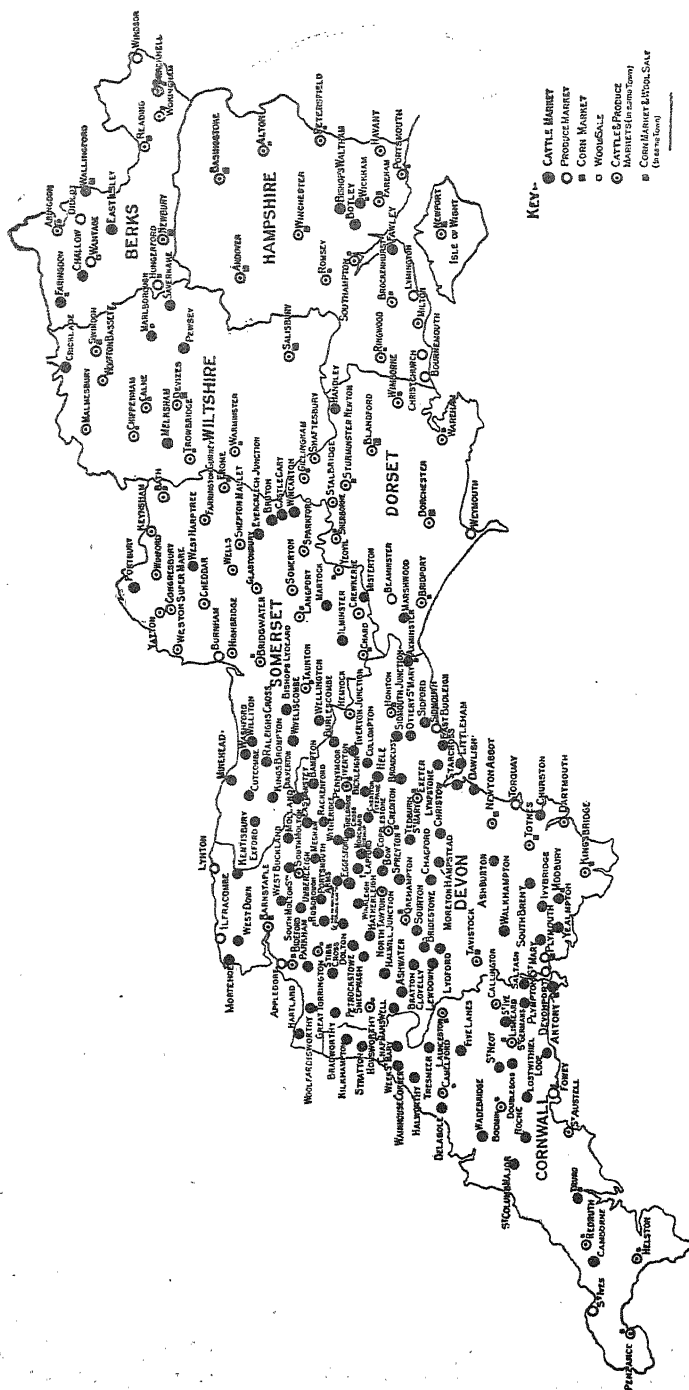


Fig. 3.—Distribution of Markets in the South and South-Western Counties.
(Reproduced from *Markets and Fairs, Economic Series No. 23, Ministry of Agriculture*, by kind permission of the Controller of the H.M. Stationery Office.)

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is confined to a few dealers who attend regularly.

In south Devon, the markets are fewer, and most of the store animals are disposed of at annual fairs. About the end of February, for instance, such places as South Brent, Newton Abbot, Ashburton, Moretonhampstead, Totnes, Plympton and Chagford hold these special sales, attracting buyers from a wide area. At these fairs, in 1930, about 3,000 South Devon store cattle were sold, over 1,400 of them going to the Midlands, where they would do well on the strong grazing lands.

The cattle exported from north Devon are also stores, but of the Devon breed, and the dealers find that the chief outlet for these is at Chichester, in Sussex.

The populations of Devon and (to a lesser extent) Cornwall are largely concentrated in the southern parts of those counties, and therefore the "home" market is to be found in the south. Thus, there is a large demand for fat cattle at Plymouth, while Newton Abbot is the market centre for dairy cattle, the dairy industry being particularly active in this locality.

For export of cattle the Exeter market is the largest in the two counties and forms a clearing house for the area. Many fat cattle are distributed from this centre to other parts of the Kingdom, the chief destinations being south Wales, the south-coast towns and London.

The importation of cattle into the area is, to a certain extent, the result of ordinary trade connexions with the bordering counties. Plymouth attracts many fat cows from Somerset and, in 1930, several hundred Irish cattle, mostly for south Cornwall, arrived via Bristol. Noticeable activity in the cattle traffic occurred in the spring and autumn months, when stores, for grass and winter feeding, respectively, were put upon the markets.

Calves.—Calves differed from the other classes of farm live stock considered here, in that the imports exceeded the exports. The number exported was under 2,000, while just over 7,000 were imported into the area. Most of the calves exported were sent to counties in the south of England. There was some demand for veal calves from London and from the counties on the Devon border. Guernsey calves from west Cornwall, particularly Redruth and Truro, were consigned, in some number, to Reading, while west Cornwall and east Devon slaughtered calves for the London market.

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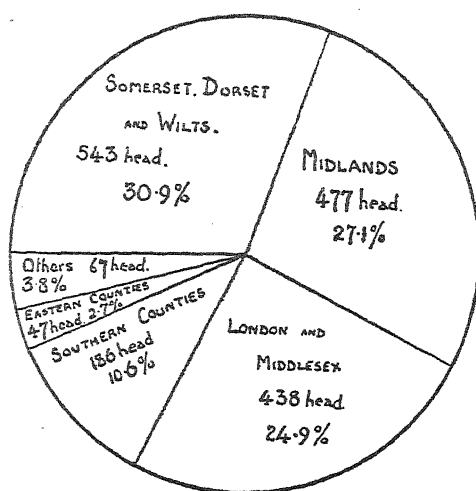


FIG. 4.—Percentage Distribution of Calves Railed from Cornwall and Devon, 1930.

The imports of calves came from a few well-defined sources, north-west Dorset and that part of Somerset which includes Crewkerne, Chard, Wincanton and Yeovil, being the chief individual areas of supply. Ireland sent about 1,000 head altogether, these arriving via the port of Bristol. Other supply sources of note were Wiltshire, and the intensive industrial area formed by the counties of Cheshire, Staffordshire, Derby, Yorkshire and north Shropshire. Most of the calves introduced into the area were of dairy breeds, Shorthorns being the most numerous.

The movement from local area to local area is not the least outstanding of the movements disclosed by the railway statistics. East Devon, mainly through Honiton and Axminster, consigned a large number of calves to north Devon and north Cornwall, these last two districts being also responsible for the large importation of calves from other counties, thus furnishing a good example of a rearing area making up its deficiency in calves by drawing on the surplus stocks of milk-producing areas. The main seasonal activity in the calf traffic occurred in the early summer.

Sheep.—A few figures will serve to indicate the movements of rail-borne sheep. As with cattle, the number exported considerably exceeded the number imported. In addition to 187,000 moved within the borders of the area (Devon and Cornwall), the railway systems, in 1930, carried

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an export of about 42,000 and an import of about 16,000 head. To a casual observer, it might appear that the surplus for export was not so great as with cattle, but it has to be remembered that an enormous number of sheep—about 180,000—were slaughtered in the area for the London market, and are not reckoned with the live stock handled by the railways.

The chief receiving counties for exports of Devon and Cornwall sheep lie well to the south of England, and Fig. 5 shows that the neighbouring counties take a very large share, Somerset, with such big markets as Bridgwater, Charlton Mackrell and Taunton, being the largest importer. North Devon is easily the greatest exporting district of the south-west area and, together with Cornwall (north and south), also supplies a good deal of the local demand in south Devon and south Cornwall, where, as has been noted already, the bulk of the population of the counties is located.

Strange as it may seem, north Devon, without any large consuming centres, is the best local market for sheep. The centre of a large sheep-rearing region, a considerable slaughterhouse business has been developed in it, carcasses being consigned by rail to Smithfield Market, London. As mentioned in the Linlithgow Report of 1924, this trade was encouraged by the railway companies, which provided slaughtering facilities and offered an attractive rate for the carriage of *dead* as compared with that for *live* stock.

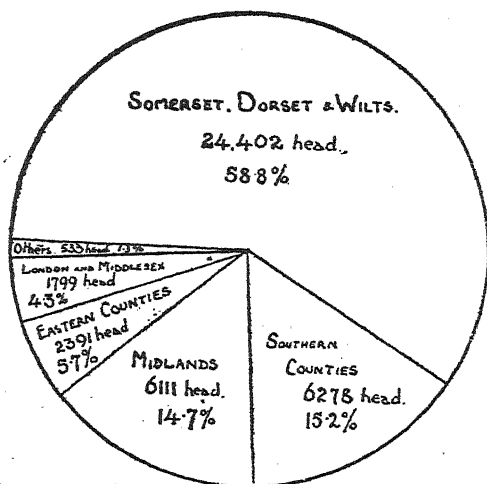


FIG. 5.—Percentage Distribution of Sheep Railed from Cornwall and Devon, 1930.

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To a lesser extent, the same method of disposal obtains in east Devon; indeed, most of the imports of sheep from counties outside Devon and Cornwall, in 1930, were directed towards two large slaughterhouses in this locality.

Exeter acts as an important clearing house for fat sheep, most of which are sent to the slaughterhouses in east and north Devon, and to the consuming centres of south Devon, of which Plymouth is the chief. The latter, also, draws many fat sheep from south Cornwall and south Devon.

Of imports from other areas, over 70 per cent. came from Somerset; and it is worth noting that, after Dorset, Scotland, in spite of the distance, came next on the list of districts sending sheep into the south-west area.

Largely on account of the presence of store and breeding sheep on the markets at the time, the 1930 autumn traffic showed a decided increase, both locally and for export. Imports, although comparatively small in quantity, were confined to the period March-September, for killing when the local supplies were insufficient to meet the demand, especially of the east Devon slaughterhouses.

Pigs.—Pig-rearing in the south-west is confined mainly to west Cornwall and east Devon. Redruth, Tiverton Junction, Totnes and Uffculme, possessing bacon factories or slaughterhouses, are the chief centres served by the railways.

During 1930, the railways carried 54,000 pigs, within the borders of the two counties, and in addition 51,000 were exported from the area, and over 2,000 were brought into it, these figures further emphasizing the fact that the exporting of live stock from the south-west is a matter of first magnitude. It is interesting to note that the export total was almost as great as the total handled locally, and that, of the last-named, all but 3,000 had been dealt with at the centres mentioned above. Fig. 6 illustrates the significant fact that about 95 per cent. of the live pigs exported were received in Somerset, Dorset, Wiltshire and the Midlands, the explanation doubtless being that they were taken up by the large bacon factories, such as those at Calne, Chippenham, Trowbridge and at Bordesley, near Birmingham.

Whilst Wiltshire took rather more than half of these pigs from Devon, Warwickshire took more than 12,000 of its 13,577 head from Cornwall. The type of bacon-pig required by the Midlands is a somewhat heavier animal than that in

LIVE-STOCK MOVEMENTS IN THE SOUTH-WEST

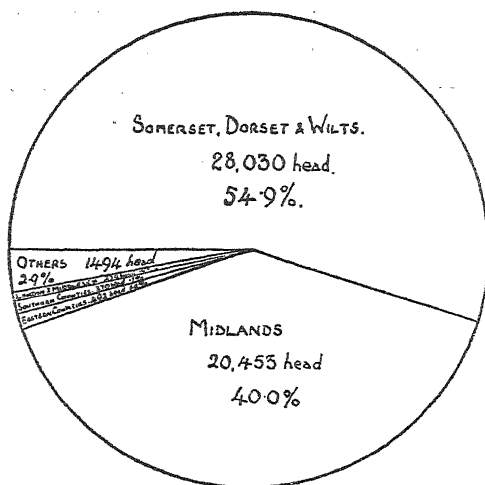


FIG. 6.—Percentage Distribution of Pigs Railed from Cornwall and Devon, 1930.

demand for the Wiltshire cut. Both on the local and export sides, the Cornish pig industry is about twice the size of that of Devon.

The small importation into the area came chiefly from Somerset and Wiltshire to east Devon, probably the result, to a large extent, of slaughterhouse demand.

The greatest seasonal activity in the pig traffic was observed after the summer months, during which period pork is out of season. In consequence, there are then large supplies of pigs at the bacon stage, of which fact the bacon factories take advantage up to the end of August, when the next pork season begins. This continues and reaches its height during the following six months, and so maintains the traffic activity into the early part of the ensuing year.

SOME OBSERVATIONS ON THE METHYLENE BLUE REDUCTASE TEST

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CONSIDERABLE attention has been paid to the Methylene Blue Reductase Test as a method for the examination of milk samples where bonus payments are to be made, or where a Register of Accredited Producers is to be maintained.

The test has advantages over other methods in use, the more noteworthy of these being its cheapness and the comparative rapidity and ease with which the test can be carried out. Where these are considerations of paramount importance, as they may be to the manufacturer of milk products, the Reductase Test will be of considerable value. As a fair method for the grading of milk intended for liquid consumption, however, its value in its present form is open to question, especially where bonus payments are to be made for milk of low bacterial count.

During the past eighteen months data have accumulated, at the Bristol Advisory Centre, relating to duplicate tests on milk samples received from farms within the Province. No fewer than 398 samples have been received, the tests used being the Reductase Test, the Standard Plate Count, the Coliform Test and the Keeping Quality Test.

The data contained in this paper relate to the Wiltshire Register of Accredited Milk Producers, and the writer wishes to acknowledge with thanks the co-operation of the Agricultural Organizer for that County and of his Staff in the submission of samples and general field work.

The Reductase Test.—This test was originated by Barthel and Orla-Jensen (1912) and depends upon the fact that bacteria are able to reduce certain dyes to a colourless form. Thus, when Methylene Blue is added to milk the organisms present eventually cause the blue colour to disappear. Theoretically, the greater the number of bacteria present the more rapidly will this reduction take place, and therefore the rate of reduction should be a measure of the number of bacteria present in the sample.

The test was carried out by adding 1 c.c. of a Methylene Blue solution to 10 c.c. of the milk sample. The solution was made up from tablets specially prepared by Blauenfeldt and Tvede of Copenhagen, and so adjusted that the final

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concentration of dye became approximately 1 part to 200,000 parts of milk. Sterile test tubes with a 10 c.c. graduation mark were used and the milk and Methylene Blue mixture covered with a layer of oil to prevent contact with air. The tubes were placed in a water bath at 38° C. and examined at frequent intervals until the blue colour was discharged.

Barthel and Orla-Jensen proposed to classify samples by this means according to the scale given in Table I:—

<i>Class.</i>	<i>Reduction Time.</i>	<i>Bacterial count per c.c. assumed to be approx.:</i>
I. Good Milk	.. 5½ hr. or more	500,000 or less
II. Fair Average Quality	.. 2—5½ hr.	500,000—4,000,000
III. Bad Milk	.. 20 min.—2 hr.	4,000,000—20,000,000
IV. Very Bad Milk	.. 20 min. or less	20,000,000 or more

In this country, when milk less than 30 hours' old contains over 1,000,000 organisms per c.c. it would not be regarded as of "Fair Average Quality." The maximum counts allowed for any designated milk is 200,000 per c.c. and milk containing over 750,000 per c.c. gains no marks on the score of bacterial count in our Clean Milk Competitions. Indeed, all counts over 500,000 per c.c. might be regarded as excessive in milk produced and handled in accordance with the provisions of the Milk and Dairies Order, 1926, and in the experience of firms who have instituted schemes of bonus payment for hygienic quality, counts well below this figure are invariably maintained.

Although quite valid objections may be raised to any comparison between the Plate Count and the results of the Reductase Test, the former is so well known and has become so firmly established in this country that such a comparison is inevitable. In Table II the 398 samples examined are arranged according to Plate Count and also under the respective reduction times found. Keeping in mind Barthel and Orla-Jensen's standard for good milk, an examination of Table II will show that 292 samples had a reduction time of 5½ hours or more, but that 7 of these had a bacterial count in excess of 500,000 per c.c. Conversely, of the 106 samples with a reduction time of less than 5½ hours, 36 had bacterial counts of less than 500,000 per c.c.

Hiscox and Starling (1925) pointed out that no claim is made for the Reductase Test as an exact method for estimat-

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TABLE II.—DISTRIBUTION OF SAMPLES ACCORDING TO PLATE COUNT AND REDUCTION TIME.

Count per c.c.		Count Group	REDUCTION TIME IN HOURS																								Total Samples
			1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12		
0-500	1								1				2	2	6	6	4	7	4	1						33	
501-1,000	2													1	7	9	2	1	3							23	
1,001-2,500	3														4	11	4	9	4	3	1					40	
2,501-5,000	4															3	6	16	5	3	4	2				39	
5,001-7,500	5										1					1	3	5	4	5	2	1	2			29	
7,501-10,000	6															2	3	4	3	2	1	1	2			20	
10,001-20,000	7													1												33	
20,001-30,000	8															1	2	1	3	4	2					15	
30,001-50,000	9																									18	
50,001-100,000	10																									24	
100,001-200,000	11																									18	
200,001-300,000	12																									13	
300,001-500,000	13																									16	
500,001-750,000	14																									10	
750,001-1,000,000	15																									7	
Over 1,000,000	16																									60	
Total Samples		26	16	15	10	7	4	2	11	9	6	8	16	31	67	46	44	38	20	17	3	2				398	

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ing the number of bacteria in milk, but that it is claimed that milk of Class I on Orla-Jensen's Scale almost invariably has a count of less than 500,000 per c.c. It will be seen from Table II, however, that samples with a reduction time of as much as $9\frac{1}{2}$ hours may have bacterial counts of 500,000 per c.c.

It is evident from the wide range in reduction time for the samples in any Count Group in Table II that the Reductase Test cannot be accepted as a reliable and fair method for the classification of milk where price differentiations are made.

The Tests as an Indication of Keeping Quality.—From the trade point of view the main object in the bacteriological examination of milk from individual producers is to obtain a measure of the care exercised in production, and hence of the keeping quality and general commercial utility of the milk. It is therefore desirable to examine the relative efficiency for this purpose of the tests employed.

The general practice is to use the Coliform Test in conjunction with the Plate Count, and it is usually recognized that the results of the first are in closer agreement with the keeping quality than are those of the second. If the Reductase Test were found to give a better indication of the commercial value of the milk, obviously there would be more reason for its adoption in preference to the Plate Count.

TABLE III.—KEEPING QUALITY IN RELATION TO PLATE COUNT OF SAMPLES WITH B.COLI ABSENT IN DILUTIONS ABOVE 1 C.C.

Keeping Quality (Days)	Plate Count per c.c.																Total Samples
	Over 1,000,000	750,001-1,000,000	500,001-750,000	300,001-500,000	200,001-300,000	100,001-200,000	50,001-100,000	30,001-50,000	20,001-30,000	10,001-20,000	7,501-10,000	5,001-7,500	2,501-5,000	1,001-2,500	501-1,000	0-500	
Bad 2 ..	1												1				2
Bad 2½ ..	1	1		1			1	1	1	1		1	3	2		1	14
Bad 3 ..	1	1	1	1			1	2	1	3	2	1	1	3	1	1	20
Tainted 3 ..	1	1			2	1	3	1	5	1	4			2	2	1	24
Sweet 3 ..					4	7	2	2	6	10	10	15	28	31	18	29	162
Total Samples ..	4	3	1	2	6	8	7	5	9	19	13	21	33	38	21	32	222

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TABLE IV.—KEEPING QUALITY IN RELATION TO REDUCTION TIME OF SAMPLES WITH B.COLI ABSENT IN DILUTIONS ABOVE 1 C.C.

Keeping Quality (Days)	Reduction Time in hours																				Total Samples
	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	
Bad 2 ..		I													I						2
Bad 2½ ..			I					I					2	3	2	2	I	I	I		14
Bad 3 ..		I						2		I		I	I	2	3	4	4	I			20
Tainted 3				I		I		I		2		2	3	2	2	6	2			2	24
Sweet 3				I					2	2	3	10	12	43	28	21	20	11	8	1	162
Total Samples		2	I	2		I		4	2	5	3	11	17	52	35	29	31	15	9	3	222

Since the presence of organisms of the Coliform group tends to reduce the keeping quality to a very marked degree irrespective of the total number of organisms present, samples containing Coliform organisms in dilutions higher than 1 c.c. have been omitted from these tables, thus leaving 222 samples for consideration.

Table III shows the distribution of samples according to plate count and keeping quality, and Table IV the redistribution of these samples according to reduction time and keeping quality. Tables V. and VI, which are based on Tables III and IV, will show clearly the respective merits of the plate count and the reductase test as indicators of keeping quality. It would seem that there is better correlation between the plate count and the keeping quality than between the reduction time and the keeping quality of the sample.

Conclusions.—(1) The reductase test is unsuitable as a method for the examination of milk of low bacterial count. Consequently, compared with the plate count, it does not constitute a fair means of determining the bonus payments to be made for such milk.

(2) The reductase test is also unsuitable for use in connexion with Registers of Accredited Producers, since the upper limit for the bacterial count is set at the comparatively low figure of 300,000 organisms per c.c.

(3) If the keeping-quality test is regarded as a measure of the commercial value of the milk, the results of the plate count are more indicative of commercial utility than are those of the reductase test.

However, the results of both tests agree only in a general way with the actual keeping quality of the sample, but it

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TABLE V.

Relationship of Plate Count
to Keeping Quality

Plate Counts per c.c.	Percentage of Samples Sweet 3 days
Under 1,000,000	—
" 750,000	—
" 500,000	—
" 300,000	76.4
" 200,000	76.7
" 100,000	76.3
" 50,000	78.0
" 30,000	79.0
" 20,000	79.7
" 10,000	82.9
" 7,500	83.4
" 5,000	85.5
" 2,500	85.7
" 1,000	88.7
" 500	90.6

TABLE VI.

Relationship of Reduction Time
to Keeping Quality

Reduction Time in hours	Percentage of Samples Sweet 3 days
Less than $2\frac{1}{2}$	20.0
Over $2\frac{1}{2}$	—
" 3	—
" $3\frac{1}{2}$	—
" 4	—
" $4\frac{1}{2}$	75.1
" 5	75.3
" $5\frac{1}{2}$	76.2
" 6	75.9
" $6\frac{1}{2}$	75.0
" 7	75.4
" $7\frac{1}{2}$	73.0
" 8	71.0
" $8\frac{1}{2}$	69.0

must be noted that, since the results reported in this paper were obtained, modifications have been introduced into the technique of the plate count* and still closer agreement between this and the keeping quality is now expected.

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* See the 1932 Edition of the *Guide to the Conduct of Clean Milk Competitions*, Ministry of Agriculture and Fisheries, Bulletin 46. Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 4d., post free 5d.

A COMMERCIAL APPLE-SPRAYING DEMONSTRATION IN 1932

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THE market demand to-day is for large, clean apples; but too large a proportion of the home-grown crop, unfortunately, is rendered unsightly by Apple Scab. Many farmers believe that, while this disease may be controlled under experimental conditions, control is virtually impossible on large acreages, because the cost of the labour and materials required becomes prohibitive.

It is rarely possible to spray all the trees on a farm in one day and in this fact lies the main difference between farm and experimental conditions. Thus, if all the trees on a farm are to receive an application within a few days of the most effective date, it is essential that the spraying be done very rapidly. As a very rough guide for commercial spraying, it is assumed that at least one acre of trees must be sprayed per day per man engaged whether handling a lance or not. Weather chances must be accepted, and to meet this factor, and to enable spraying to be completed within the desired time, the work must be commenced immediately the appropriate stage of growth has been reached. Another important point of difference is in supervision, without which it is not to be expected that good results can be obtained.

As a test of operations on a commercial scale, it was thought desirable, therefore, to carry out a spraying demonstration on a farm, with large trees, where the conditions were regarded as more than usually difficult, and to keep note of the materials, labour and machinery employed with the object of determining costs. A grant was made by the Ministry of Agriculture and Fisheries to meet part of the expenses.

Preliminary Details.—For the purpose of the demonstration, Mr. H. Payne, of Court Lodge Farm, West Farleigh, near Maidstone, kindly permitted the use of $6\frac{1}{2}$ acres of orchard, together with his 4 h.p. spraying plant and the services of five men; and for the facilities thus accorded, grateful thanks are due.

The selected orchard comprised half-standard Bramley's Seedling apple trees, 16-24 ft. in height, 30 ft. apart and

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24-30 ft. in spread, over grass sown in the autumn of 1930, grazed latterly by sheep. The plantation has a gentle slope to the N.N.W., and the soil is a medium, brown loam derived from reassorted Hythe Beds material, containing pieces of weathering ragstone. In places, the rock is within 2 ft. of the surface.

The trees were divided, as to number, into two equal groups, one for spraying with lime-sulphur and the other with Bordeaux mixture, two blocks, each of 7 or 8 trees, to be left untreated in each lot. For the Bordeaux treatment, 152 trees were available ($6\frac{1}{2}$ rows of about 23 trees each), 137 being sprayed and 15 left untreated. For lime-sulphur treatment, there were 151 trees ($7\frac{1}{2}$ rows of about 20 trees each), of which 15 were also left unsprayed. The 1931 crop had been very badly scabbed and almost worthless. The trees had received a mixed tar-petroleum wash, but this formed no part of the demonstration and, from the subsequent prevalence of some of the insect pests mentioned below, would not appear to have entirely fulfilled its purpose. When the orchard was taken over for the demonstration, it was not known with certainty what insect pests were present.

During the season, it was noted that a small amount of infestation by the Rosy Apple Aphis developed in the spring without doing any real damage; and this applied also to Apple Sucker. The buds were attacked to some extent by Apple Blossom Weevil, and there was a considerable amount of "capped blossom," probably sufficient to cause a real reduction of crop. Winter Moth caterpillars were present in numbers that necessitated the use of lead arsenate; and this was applied in the first and second fungicidal sprays at 4 lb. of the paste form (15 per cent. As_2O_5) per 100 gal. of wash, the otherwise unsprayed trees also receiving it as a special application. Some slight damage was done by the Winter Moth caterpillars. The Apple Capsid Bug was present to some extent, but the distribution was very irregular: a small percentage of the fruit was marked but no notable loss of crop was evident.

On April 4, the trees were examined, without finding young wood bearing pustules of the Scab fungus. Dead leaves of the previous season were scarce, but a few, picked up from the grass, were found to contain fruiting bodies with winter spores.

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The First Spraying.—The first spraying was begun on April 19, under sunny, calm conditions, and continued on April 20, which was dull with a strong S.W. breeze. The sprays were made up as follows:—

<i>Bordeaux Mixture.</i>		<i>Lime-sulphur.</i>	
Copper sulphate	3½ lb.	Lime-sulphur (19.8 per	
Hydrated lime	5 lb.	cent. polysulphide sul-	
Lead arsenate paste ..	26 oz.	phur content)	1½ gal.
Water to	40 gal.	Lead arsenate paste ..	26 oz.
		Water to	40 gal.

Four 10 ft. metal lances, with "Mistifier Junior" nozzles fitted with No. 2 discs, were used, the rubber delivery hoses being connected to the pump by overland "Merry-weather" pipes. At the time of this first spraying, two of the five blossom-truss leaves were occasionally unfolding and becoming flattened, but the flower-buds were tightly clustered and green.* Most of the leaves, however, were just escaping from the protection of the bud scales. In pursuance of the studies which Mr. R. W. Marsh, of the Long Ashton Research Station, has been making as to which stage of the Scab fungus (winter spores on fallen leaves or summer spores on young wood) is the source of early infection, glass slides coated with glycerine were exposed in trees in three different parts of the orchard from April 25 to May 5. On examination by Mr. Marsh, these were found to be bearing six winter spores of the fungus per ½ in. square of surface.

The Second Spraying.—The second spraying, on May 13, was completed in one day under calm conditions or with a slight breeze from the S.W. Slight rain during the spraying of the Bordeaux plot caused an interruption for about 15 minutes. The spray fluids were as before except that a soluble "spreader" at 2 lb. per 100 gal. was added to the lime-sulphur. Nozzles fitted with No. 2 discs were used; these appeared to give a fine spray, but were found, on later inspection of the trees, to have had a spattering rather than a spraying effect, and the leaves were rather heavily coated with deposit.

The buds were in the early "pink bud" stage, with no petals open, and commonly with 5-6 leaves expanded round the flower trusses. Scab was not found at this date on the sprayed trees, but was present on a very few blossom-truss leaves of unsprayed trees near the lower end of the lime-

* From the illustrations and descriptions of R. W. Marsh (*Jour. Pom. & Hort. Sci.*, XI, No. 1, 1931, pp. 53-72), the buds were at the "bursting," "burst," and "green-flower" stages.

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sulphur and Bordeaux plots. Injury in the form of very fine, brown spotting was present on the lower surface of blossom-truss leaves on the Bordeaux plot, although it was not serious.

The Third Spraying.—Rain in the early morning of May 27, at "petal fall," caused delay in starting the third spraying, and light showers interrupted the work. Rain fell steadily after the lime-sulphur had been applied, and continued on May 28, so that much of this spray was undoubtedly washed off the foliage. A dilution of 1 gal. of lime-sulphur to 79 gal. of water, plus "spreader" as before, was used this time. On May 30, the Bordeaux mixture was sprayed, rain falling as the work was finished, removing without doubt a little of the deposit. Late that day, the lime-sulphur plot was re-sprayed with a weaker mixture (1 in 100), in an attempt to replace the spray that had been washed off on May 27.

This third application of Bordeaux mixture was through No. 0 discs, the lime-sulphur being applied through discs intermediate between Nos. 2 and 3, which delivered two gallons of fluid each per minute and necessitated spraying with only three lances owing to the pump being unable to deliver more than 6 gal. per minute.

At this period, on certain branches of the lime-sulphur sprayed trees, there was slight but distinct scorching of the leaves of the blossom-trusses, possibly due to the spray of May 13. On the Bordeaux-sprayed plot, a slight, purple-spotting occurred on the blossom-truss leaves without noticeable ill effect. Scab was only rarely found on the unsprayed plots, but was nevertheless present in small amount on every tree. It occurred in the form of spots (about 4 mm. in diameter) on the blossom-truss leaves and on the lower leaves of the elongating young wood.

The Fourth Spraying.—The fourth spraying was carried out on June 16, a warm, sunny day with only a slight N.E. breeze. The lime-sulphur plot was sprayed with a 1 in 100 solution through the same discs as in the third spraying, and the trees were rapidly washed with a heavy spray and not branch by branch. The "Merry-weather" portable pipes were not used on this occasion, but the sprayer was drawn by a tractor, returning to the mixing tubs for each refilling, though no saving of time resulted. For the fourth Bordeaux spraying, a new type

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of double nozzle, the "Noblox," was used, with No. 2 discs, and the variable vortex nearly closed up, providing a considerable volume of fine spray, about 4 gal. per tree being applied (see Table 2).

At this time, an outstanding feature of the unsprayed plots was the scabby condition of the younger foliage; the fruit-truss leaves and the lower (older) shoot leaves were not at all generally attacked. The infection of the younger leaves was severe, and it was noted as the beginning of a strong attack, many leaves being actually velvety with Scab. Thus, shoots with 8 leaves showed the lower 4 healthy and the younger 4 all infected; young wood shoots, 8 in. long with 12 leaves, showed the fungus only on the 7th, 8th, and 9th from the base. The apples showed no infection at this stage. On the lime-sulphur plot, a very slight scorching was present here and there, the edges of the leaves having turned brown, but it was not general or in any way serious. Scab was occasional on the sprayed trees, though it occurred only on older leaves missed in the third spraying, or on young leaves, the apples being healthy. It was considered that the fourth spraying now being done was evidently needed, as an attack of Scab was developing. Scab was present on the Bordeaux-sprayed trees, but less so than on the lime-sulphur plot, showing on the young, unsprayed leaves (usually 2 in number) of shoots, or even on the last leaf showing traces of spray. The young wood shoots on both plots showed Scab on the last leaves sprayed, but not on younger leaves. This fact almost certainly showed that a spread of infection was taking place just before the spraying on May 30. A new wood shoot, 7 in. long with 12 leaves, showed 6 sprayed and healthy leaves, the 7th just marked by the spray, being infected, and the last 5, evidently expanded since the third spraying, as yet healthy.

At East Malling, Kent, about $2\frac{1}{2}$ miles away, 36 of the 61 days of April and May were rainy, 4.87 inches being measured. June was exceptionally dry with only five rainy days and 0.69 in. of rain, and the dry conditions continued until the last week of July.

On July 5 the orchard was again inspected, and no appreciable scorch or damage was observable from either spray mixture, and there was no fall of fruit or leaves. The trees in both sprayed plots were very healthy, and

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Scab was not to be seen on the leaves. Here and there, however, Scab infection of the apples (now up to $1\frac{1}{2}$ in. diam.) was noticed. Very little new wood-growth had taken place, so that all the foliage appeared to be well covered by the last application of the sprays. At this date, the control of Scab on the lime-sulphur plot was regarded as equal to that on the Bordeaux plot. On the unsprayed plots, the disease was still in evidence on the younger foliage, but the attack was not very severe. For example, shoots with eight leaves were infected only on the three youngest, where large black spots (about $\frac{1}{2}$ in. diam.) and black areas along the veins showed that the disease was established much as it had been on June 16. Only rarely could an infected apple be seen. The healthy condition of the small leaves surrounding the fruit trusses, which are commonly the first to become infected, most certainly indicated that the two early applications on the sprayed plots in this season had not been of so much value; the disease had not, even by July 5, gathered its full strength for attack. In the last week of July, however, a rainy period occurred, 1.86 in. falling at East Malling in that time, and this may have played some part in the increase of infection that, it was found, occurred later.

Though no leaf-fall was caused, the leaves of the Bordeaux-sprayed trees, from August onwards, showed a dark-purplish tint, reminiscent of walnut foliage, while those of the lime-sulphur sprayed trees were of the normal green colour. This damage on the Bordeaux plot did not appear to have affected the crop in any way.

Grading.—On September 26 and 27, the crop was picked and the apples graded by hand for the amount of Scab present. Those entirely free from the disease, or having an area of Scab not exceeding that of three pins' heads (i.e. 3 areas each of 2 mm. diam.) were included in Grade 1; those with more Scab than this were placed in Grade 2.* No apples were found so severely attacked as to be placed in Grade 3, i.e., so cracked or disfigured by Scab as to be unmarketable. The sprayed plots were of such a size that it was found impossible, under the conditions of sale of the fruit, to carry out the grading of the

* This system of grading is that adopted in all Scab-spraying experiments at Wye College, and is defined in this JOURNAL, Vol. XXXIII, April, 1926.

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TABLE 1.—BRAMLEY'S SEEDLING, 1932.

Treatment of Plot.	No. of Trees.	No. of Apples.	Number in Grade		Percentage by number in Grade		No. of Bushels.	No. of Bushels in Grade	
			1	2	1	2		1	2
BORDEAUX MIXTURE:									
N. of Upper Unsprayed ..	8	2640	2476	164	93.8	6.2	24	22	2
S. of Upper Unsprayed ..	8	3374	3202	172	94.9	5.1	29	27½	1½
N. of Lower Unsprayed ..	7	2730	2428	302	88.9	11.1	29	26	3
S. of Lower Unsprayed ..	7	1806	1588	218	87.9	12.1	17½	15½	2
UNSPRAYED:									
In Bordeaux (Upper) ..	8	3785	1094	2691	28.9	71.1	31½	9½	22
In Bordeaux (Lower) ..	7	1309	484	825	37.0	63.0	11½	4½	7
In L. Sul. (Upper) ..	7	3398	864	2534	25.4	74.6	30¾	8½	22½
In L. Sul. (Lower) ..	8	2731	546	2185	20.0	80.0	22½	5	17½
LIME-SULPHUR:									
N. of Upper Unsprayed ..	7	3378	1970	1408	58.3	41.7	31	18	13
S. of Upper Unsprayed ..	7	2459	1944	515	79.1	20.9	24½	19	5½
E. of Lower Unsprayed ..	8	1376	1029	347	74.8	25.2	15	11	4
W. of Lower Unsprayed ..	8	2760	1984	776	71.9	28.1	24½	17½	7

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whole crop. Hence a few trees were selected on each side of each unsprayed block, and the entire crop from these was graded. Thus, when 8 or 7 trees formed an unsprayed plot, the whole of the crop on either 16 or 14 sprayed trees adjoining was used for comparison. The figure obtained are set out in Table 1.

At the time of grading it was found that a late attack of Scab had evidently taken place, i.e., since the month of July, for in the unsprayed plots (where all the apples were graded) from 63 to 80 per cent. of the fruit found its way into Grade 2. Whereas, in July, no difference in the healthy state of the two sprayed plots could be distinguished, it was now shown that in the two plots from 21 to 42 per cent. of the lime-sulphur sprayed apples and from 5 to 12 per cent. of the Bordeaux-sprayed fruits were in Grade 2.

Labour and Materials used and Costs.—The dates of application, quantities of spray fluid used, materials used, number of men employed, times taken, and costs at current rates, are set out in Table 2.

TABLE 2.

<i>Date.</i>	<i>LIME-SULPHUR.</i>			<i>BORDEAUX MIXTURE.</i>		
	<i>Quantity of fluid,</i>	<i>Costs.</i>		<i>Quantity of fluid,</i>	<i>Costs.</i>	
	<i>Materials,</i>	<i>No. of men,</i>	<i>Hours of work.</i>	<i>Materials,</i>	<i>No. of men,</i>	<i>Hours of work.</i>
		<i>£</i>	<i>s. d.</i>		<i>£</i>	<i>s. d.</i>
April 19	770 gal.			600 gal.		
& 20	23 gal. lime-sulphur	1	8 9	48 lb. copper sulphate	10	9
	31 lb. lead arsenate	1	3 3	72 lb. hydrated lime	3	3
	5 men, 6½ hours	1	3 0	24 lb. lead arsenate	18	0
				5 men, 5½ hours	19	6
May 13	520 gal.			500 gal.		
	16 gal. lime-sulphur	1	0 0	40 lb. copper sulphate	9	0
	21 lb. lead arsenate	15	9 9	60 lb. hydrated lime	2	8
	5 men, ½ day	17	6 6	20 lb. lead arsenate	15	0
				5 men, ½ day	17	6
May 27	720 gal.					
	7½ gal. lime-sulphur	9	1 1			
	15 lb. spreader	10	6 6			
	4 men, ½ day	14	0 0			
May 30	530 gal.			440 gal.		
	5½ gal. lime-sulphur	6	10 10	35 lb. copper sulphate	7	11
	11 lb. spreader	7	6 6	53 lb. hydrated lime	2	5
	4 men, ½ day	14	0 0	5 men, ¾ day	1	6 3
June 16	560 gal.			545 gal.		
	5½ gal. lime-sulphur	6	10 10	44 lb. copper sulphate	9	10
	3 men, 4½ hours	10	8 8	66 lb. hydrated lime	3	0
				3 men, 6 hours	14	3
Total		£10	7 8			£7 19 4

Table 2 shows that the cost of the Bordeaux spraying

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was £7 19s. 4d. That of the lime-sulphur was £10 7s. 8d., from which should be deducted, for purposes of comparison, the sum of £1 8s. 4d., the cost of repeating the third spraying which had been washed off by rain. It is also evident that the labour requirement was progressively reduced at each spraying, and that the time taken was also lessened. This was the result of increasing the nozzle output, a matter discussed in the new edition of Bulletin No. 5,* published by the Ministry of Agriculture.

The total cost of labour and material, for the four sprayings, amounted to £18 7s., equal to £3 4s. 7d. per acre. This does not include the cost of the machinery, which may be estimated at about 30s. per acre for a whole season, or of the mixed oil-wash applied by Mr. Payne before the demonstration commenced.

Discussion of Results: Bordeaux Mixture.—The unsprayed trees in the upper half of this plot gave 28.9 per cent. of healthy apples, while the sprayed trees north and south of them gave, respectively, 93.8 per cent. and 94.9 per cent., or an increase of 65.4 per cent. over the unsprayed. The unsprayed trees in the lower half gave 37.0 per cent. of healthy apples, while the sprayed trees north and south of these gave, respectively, 88.9 per cent. and 87.9 per cent., or an average increase in percentage of healthy apples of 51.4 per cent.

Lime-Sulphur.—The unsprayed trees in the upper half gave 25.4 per cent. of healthy apples, while the sprayed trees north and south of them gave, respectively, 58.3 and 79.1 per cent., or an average increase in percentage of healthy apples of 41.7. The unsprayed trees in the lower half of this plot gave 20.0 of healthy fruits, while the sprayed trees east and west of these gave, respectively, 74.8 per cent. and 71.9 per cent., or an average increase in percentage of healthy apples of 52.8 per cent. A considerable proportion of the apples placed in Grade 2 showed only small amounts of Scab.

The increase in the percentage of healthy apples varied then from 51 to 65 in the Bordeaux-sprayed plots, and from 42 to 53 in the lime-sulphur plots. These results, obtained so inexpensively in the first year, in an orchard where

* *Commercial Fruit Tree Spraying and What It Costs*: H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 9d., post free rod.

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attacks of Scab had been so severe in previous seasons that much of the fruit had been nearly worthless, must be considered satisfactory. The distinctly better control of Scab by home-made Bordeaux mixture as compared with lime-sulphur is in accordance with what has been found elsewhere. While the use of lime-sulphur caused no damage to the foliage or fruit of the sprayed trees, the Bordeaux mixture, applied in nearly similar amount, caused a certain amount of injury, although not of commercial importance. No "russetting"* was caused to the fruit, but the foliage was obviously affected towards the close of the season by the Bordeaux mixture.

Application.—By increasing the rate of discharge from the nozzles the rate of spraying was substantially speeded up, until at the last spraying the times were as follows:—

<i>Spray.</i>	<i>Acres sprayed.</i>	<i>Men.</i>	<i>Hours.</i>
Lime-sulphur	2 $\frac{3}{8}$	3	4 $\frac{1}{2}$
Bordeaux	2 $\frac{3}{8}$	3	6

This is considerably less than the time taken in ordinary commercial practice, and is equivalent to three men spraying 29 acres with lime-sulphur, or 22 acres with Bordeaux mixture, in five days. The conditions of large trees and active men, who worked exceptionally well, favoured the use of large capacity nozzles, especially with lime-sulphur. The greater time taken with Bordeaux mixture was due to the need for using a fine spray and nozzles of smaller capacity.

Summary.—1. Four sprayings to control Scab with lime-sulphur and with Bordeaux mixture on 6 $\frac{1}{2}$ acres of large Bramley's Seedling apple trees are described.

2. Observations on the development of an attack of Apple Scab are presented.

3. Costs of the sprayings are given, and times required for application, both being less than is common in commercial practice.

4. Evidence is given that the rate of nozzle discharge influences the rapidity of spraying very considerably.

5. A satisfactory control of Apple Scab was obtained, at small cost.

ACKNOWLEDGMENTS.—The technical notes from which this text is prepared were the work of the following members of the staff of the

* On a small percentage of the Bordeaux-sprayed apples, minute reddish spots were produced. The marks would not be of commercial importance on a culinary apple like the Bramley Seedling.

PIG-FEEDING IN WINTER AND SUMMER

South-Eastern Agricultural College, Wye:—Professor E. S. Salmon and Mr. W. M. Ware (Mycologists), Mr. S. G. Jary (Entomologist), Dr. W. Goodwin (Chemist), and Mr. C. Davies (Agricultural Engineer), Mr. J. Turnbull (Ministry of Agriculture) took an active part in timing the operations, testing rates of nozzle discharge, and recording quantities sprayed. He is also responsible for the labour costings. The co-operation and interest of all these are gratefully acknowledged.

Thanks are also due to Messrs. Cooper, McDougall and Robertson, Ltd., who supplied the lime-sulphur and lead arsenate; to Messrs. Drake and Fletcher for the loan of nozzles; to Mr. Payne's staff for their good work.

PIG-FEEDING IN WINTER AND SUMMER: A FINANCIAL STUDY

By STEPHEN BARRATT, B.Sc., N.D.A.,
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Seasonal Price Variations.—In the county of Cheshire, particularly on farms where whey is available, there is a tendency to regard pig feeding as a summer business, many stores being bred and purchased for this purpose during the spring months. This seasonal demand naturally tends to lift the price of stores during the months of March, April and May, whereas the partial flooding of the September and October bacon market produces a lowering of selling values in the autumn.

On the other hand, it would be reasonable to suppose that a considerable avoidance of winter pig feeding would make autumn stores cheaper and give a better selling-out value for baconers in the spring months.

The Problems.—Three interesting points are worthy of investigation:—

1. Does winter pig feeding really leave a greater margin between purchase and sale values than does summer feeding, and, if so,
2. How much is the margin, and
3. Does this margin in favour of winter feeding cover the increased food consumption and losses to live stock that might reasonably be expected during the winter months? Not only cold weather but lack of whey may be expected to increase meal consumption.

These questions, of interest at any time to the cheese-maker, must now be of importance to all who contemplate the possibility of "contracting" for bacon production.

The Price Margin.—Over a period of three ordinary pig price cycles, amounting to eleven years in all, it appears (Table 1) that, on the average, summer-fed pigs have cost at purchase 8s. more per head than have those fed during the winter months. The selling prices for baconers during

PIG-FEEDING IN WINTER AND SUMMER

TABLE 1.—PURCHASE AND SELLING PRICES.*

Year.	Stores, 8-12 weeks.		Baconers.	
	Shillings.		Shillings per score (dead).	
	Averages.		Averages.	
	Mar., Ap. & May.	Sep., Oct. & Nov.	Sept. Oct. & Nov.	Mar. Ap. & May.
1922 ..	44/-	43/-	20/10	—
3 ..	52/8	35/-	17/9	18/-
4 ..	29/4	19/4	17/8	15/3
5 ..	33/-	34/8	19/10	19/3
6 ..	51/8	47/-	18/6	21/4
7 ..	46/4	25/8	12/9	18/4
8 ..	24/4	19/4	14/-	17/4
9 ..	44/4	43/4	16/9	19/-
1930 ..	49/4	38/8	13/3	18/4
1 ..	33/8	21/4	9/6	13/8
2 ..	21/8	16/4	9/8	12/3
3 ..	—	—	—	13/6
Average over 11 years	39/3	31/3	15/6	16/11
Difference in favour of Winter-fed pig (say 7½ score dead)		8/-		1/5 × 7½ 10/7
Total variation in favour of Winter- fed pig			18/7	
or				
At present-day price levels		5/6	12/6	7/-
			would be a possible margin.	

the same eleven years have been 1s. 5d. per score less in the autumn than in the spring months, both margins being in favour of winter feeding. On the basis of 200 lb. alive, or 150 lb. dead, *the winter-fed pig appears to have started with an advantage of 8s., and sold out with a further addition of 7½ times 1s. 5d., or a total margin in his favour of 18s. 7d. per head.* For purposes of discussion, however, it is necessary to realize that prices during the past eleven years have been higher than we are likely to enjoy in the future, and that a margin of say 12s. 6d. is probably a reasonable expectation at the present-day price level.

Available Information on Seasonal Feeding.—It is natural to assume that losses and food consumption will be higher during winter than during summer months, and in an attempt actually to measure these extra costs, the records collected on the Reaseheath Farm, Cheshire School of Agriculture, have been brought together in Tables 2 and 3.

The pigs to which the statistics refer have been fed under

* Agricultural market report (Shrewsbury).

PIG-FEEDING IN WINTER AND SUMMER

TABLE 2.—RESULTS FROM THE REASEHEATH HERD.
SUMMER-FED PIGS.

<i>Lot.</i>	<i>No. of litters.</i>	<i>No. pigs weaned.</i>	<i>Foods fed equiv. lb.</i>	<i>Deaths.</i>	<i>Poor Doers.</i>	<i>No. sold.</i>	<i>Ave. wt. at sale.</i>	<i>Total increase in wt. lb.</i>	<i>Ratio. Food to L.W. incr.</i>
1	2	16	9860	1	2	15	164	2012	4.90
2	3	21	10635	1	6	20	150	2273	4.68
3	1	10	6643	—	—	10	220	1841	3.61
4	3	25	16462	1	4	24	198	3972	4.15
5	3	22	13256	2	4	20	201	3213	4.12
6	2	22	13364	—	5	22	202	3805	3.51
7	4	38	25384	—	2	38	191	5731	4.43
Totals	18	154	95604	5	23	149	189	22847	4.18 ± .12

Average selling weight 189 lb.

Food consumed per 1 lb. L.W. increase 4.18 lb. ± 0.12 lb.

TABLE 3.—WINTER-FED PIGS.

<i>Lot.</i>	<i>No. of litters.</i>	<i>No. pigs weaned.</i>	<i>Foods fed equiv. lb.</i>	<i>Deaths.</i>	<i>Poor Doers.</i>	<i>No. sold.</i>	<i>Ave. wt. at sale.</i>	<i>Total increase in wt. lb.</i>	<i>Ratio. Food to L.W. incr.</i>
1	2	18	8695	—	—	18	137	1928	4.50
2	2	23	10225	1	3	22	153	2682	3.81
3	4	35	17180	4	1	31	164	4052	4.24
4	5	38	10890	7	—	31	118	2411	4.52
5	2	12	7130	1	—	11	206	1903	3.75
6	4	31	12410	—	4	31	141	3425	3.63
	19	157	66530	13	8	144	147	16401	4.06 ± .10

Average selling weight 147 lb.

Food consumed per lb. L.W. increase 4.06.

Calculated food consumption had Winter pigs been fed to

Summer weights 4.17 lb. ± 0.10 lb.

normal cheese-farm conditions, receiving about two-thirds of a gallon of whey per head per day during summer, but on the average only one-half this amount during winter months. In order to determine equivalent total quantities of meal consumed, one gallon of whey has been assumed to represent $\frac{1}{2}$ lb. of concentrated food.

During the past two years, all pigs weaned on the Reaseheath farm have been numbered and weighed, food consumption has been recorded weekly, and all pigs have been weighed at intermediate times and at sale. Deaths and records of poor doers have been included in the tables, which concern all pigs weaned on the farm during the appropriate months, amounting to 154 during March, April

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and May, and to 157 weaned during September, October, and November.

Of interest to the breeder is the fact that the 154 spring weaners were from 18 sows, 8.6 per litter, against 157 from 18 sows or 8.3 per litter in the autumn.

Limitation of the tables to pigs that were weaned during two three-monthly periods has unfortunately cut down the total available to approximately 300 pigs in all. These are, however, evenly divided between summer and winter, and should therefore point to any accountable variations that might exist in losses and food consumption.

Losses.—The 28 summer losses, representing 18 per cent. of the weaned pigs, include a high proportion of "poor doers," which are only partial losses, whereas the 21, or 13 per cent., of winter losses, are a smaller proportion, but are mainly deaths involving total loss. On the whole, it would seem reasonable to suggest that under Reaseheath conditions the cash value of live-stock losses has not been vastly different during the winter months from that experienced during the summer months.

Food Consumption.—(a) *Effect of Varying Selling Weights.*—It is impossible to consider seasonal food consumption, without taking into account the fact that a proportion of winter-fed pigs find their way into the Christmas and January pork market at weights considerably below 200 lb. alive. Unfortunately the feeding results on the Reaseheath farm have been affected by this practice, in that selling a portion of the winter pigs as porkers has resulted in their exclusion from the tables during the weeks of their life when food consumption per 1 lb. of live-weight increase would have been at its highest.

Before making comparisons between the winter and summer food ratios it is therefore desirable to adjust the 4.06 lb. fed to pigs sold at an average of 147 lb. live weight, in such a manner as to indicate what it would have been had the pigs been retained to 189 lb. live weight.

The theoretical $\frac{\text{food}}{\text{live-weight}}$ ratio between 140 and 180 lb. live weight, according to W. B. Mercer,* is 4.5; hence, if the 144 pigs were fed through another 40 lb. live weight they would have consumed a further $144 \times 40 \times 4.5$ lb.

* *Pig Breeders' Annual*, 1928-9.

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food, making in all 92,450 lb. The additional live-weight increase would have been 144×40 lb., making a total of 22,161 lb. Hence, if winter feeding had gone on to bacon weights the food consumption would have been in the region of *4.17 lb. per 1 lb. of live-weight increase against *4.18 lb. during the summer months.

(b) *Actual*.—The ratios showing food consumed per 1 lb. of live-weight increase have varied for individual lots within rather wide limits, but from calculation of the probable errors of the averages, it is clear that the figures show no significant differences between the results of summer and winter feeding respectively. Either there is in fact no difference, or the difference is too small to be determined from the results with 300 pigs.

Food Prices.—The quantities of food consumed are naturally of importance, but are of less significance than their money values. In Table 4 are given the average prices of representative pig foods during the months of January and July for the past eleven years. The differences between

TABLE 4.—SEASONAL FOODSTUFF PRICES. ELEVEN
YEARS' AVERAGES, 1922-33.

				<i>July.</i>	<i>January.</i>
Middlings	..	..	..	7/5½	7/6
Barley Meal	..	..	..	9/11	9/9
Maize Meal	..	..	..	9/1½	9/-

summer and winter values over a period of years are insignificant, and suggest that food prices have little or no bearing upon the relative costs of seasonal pig feeding.

Availability of Whey.—The figures for food consumption shown in Tables 2 and 3 have been adjusted in such a way as to refer to all meals, 1 gal. of whey having been assumed to be the equivalent of $\frac{1}{2}$ lb. of concentrated food. On many farms the quantity of whey available during the summer months must be something like one gallon per pig per day more than during the winter months, and to replace this it is necessary to buy say 90 lb. of corn worth 5s. 6d. in value. To the cheese-maker, therefore, the winter margin of 12s. 6d. is reduced, after the purchase of extra meals, to

* In view of the importance at present attaching to such ratios as these it is necessary to point out here that the figures 4.17 and 4.18 refer to foods actually recorded as given. From a limited number of weighings it has been determined that we buy and pay for something like 3 per cent. more food than is given. If costs were under discussion it would be necessary therefore to take as a ratio not 4.18 but 4.30.

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a cash margin of only 7s. per head over and above what he normally makes on summer feeding.

Breeding or Buying.—It will be remembered that in arriving at the margins already calculated it has been assumed that stores have been purchased, whereas perhaps the majority are reared at home, thus eliminating one of the variables—the price of stores—from the final cost of the baconer.

Table 1 shows that 5s. 6d. of the 12s. 6d. margin is enjoyed only by the store buyer, from which it follows that the winter profit margin of the breeder can only be 7s. greater than his summer margin.

Conclusions.—Varying conditions show net margins that can be tabulated as follows:—

<i>Conditions.</i>	<i>Cash Margin* in favour of Winter Feeding.</i>
	<i>s. d.</i>
Store buyer feeding all meals	12 6
„ „ replacing summer whey with purchased meals in winter	7 0
Store breeder feeding all meals	7 0
„ „ replacing summer whey with purchased meals in winter	1 6

The breeder who had also to replace summer whey with purchased corn in the winter has, it appears, made cash profits in winter approximately equal to those of summer, whereas feeders under all other conditions have quite definitely returned better cash profits from their winter than from their summer pig feeding.

The accommodation for pig feeding on many farms is unfortunately colder than that available on the Reaseheath farm, a drawback that must in some instances involve small extra food consumption and may sometimes result in prohibitive live-stock losses. The problem is, therefore, to consider, where housing conditions demand it, the desirability of going to some capital expenditure and to compare this cost with the appropriate potential margin.

The margins, it must be remembered, are over and above the profits normally taken out of summer feeding, and suggest that wherever accommodation is, or can be made satisfactory, farmers need have little fear of—in fact can look forward with a fair degree of confidence—to embarking upon winter feeding when making contracts under the bacon marketing scheme.

* The records do not suggest in the least that buying stores is more profitable than breeding; they merely compare winter and summer returns within any one set of conditions.

THE FIRST ENGLISH BOOK ON SHEEP

G. E. FUSSELL,

Ministry of Agriculture and Fisheries.

A GREAT many books on farming were published before 1749, but not one that treated exclusively of sheep. This is the more remarkable because sheep were then ubiquitous in British farming economy and the woollen industry was the staple of the country. Indeed, the prosperity or depression of the woollen industry was commonly taken to be an index of the condition of the country. If we were to believe the many pamphleteers of the day, of course, the woollen industry was always in a decline and matters were going progressively from bad to worse; yet there is little doubt that both sheep-breeding and woollen manufacture were steadily improving.

Such a hiatus in the literature of our farming, which was over two centuries old when this book was written, could hardly fail to be observed by the voluminous writers of the 18th century, amongst whom William Ellis figures picturesquely. He was a farmer, as his residence at Little Gaddesden suggests, but he was a writer primarily, and his treatises on farming are well-known to readers in this line of country. He wrote a great deal of nonsense, mixed with some sound sense, and his teachings on farming are all jumbled up with execrations of gipsies and other worthless people, as well as anecdotes of farmers and other rustic characters, so that they form a rich mine of information about contemporary agriculture and rural life.

The book on sheep is as discursive as Ellis's other works, but it contains much sound sense, although its author is much predisposed towards innovations, and believes them good however ludicrous they may be. Its title, in the verbose fashion of the day, runs: "A compleat system of experienced improvements, made on sheep, grass-lambs and house-lambs; or, the country gentleman's, the grasier's, the sheep-dealer's and the shepherd's sure guide: in the profitable management of those most serviceable creatures . . ." and modestly proclaims that it is "a work different from all others ever yet published." In a measure the last claim was true, because as Donaldson (*Agricultural Biography*, 1854) says: "As Bradley's work was the first publication on the animals of the farm, so this first work of Ellis's is the first book in the agricultural world on the

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subject of sheep, which it treats exclusively. It shows large knowledge of the subject in every detail, and a very useful mode of conveying the information . . . It is probably the most valuable of all the author's works." The book itself (1749) is an octavo of 384 pp., exclusive of the introductory matter and content pages which are very full.

Donaldson had no very high opinion of the larger part of Ellis's works, and perhaps his encomium on the book on sheep may be the better received on that account. His judgment of Ellis is that he "was not the author of any originality on the subject of agriculture, nor did he write any conception that merited that appellation. But he was a larger promoter of the art both by precept and example, and consequently occupies a niche of no low standing in the temple of agricultural fame."

However that may be, there is no doubt that we can accept what Ellis says about the type of sheep preferred in his own county. He says: "The Ram we most covet in *Hertfordshire*, is a Western Ram, and we think he is best bought in when he has four broad teeth, for that then, if he is a good Ram, and kept well, he will last a serviceable one till he is eight or nine Years old, and be sufficient to keep with a Flock of forty, fifty or sixty Ewes. For which Purpose he should be a right mark'd one; that is to say, he should be a very close-curl'd, white wool'd Sheep, broad loin'd, and wide on the top Part of his Shoulders, white-faced, and white nosed, white claw'd and white coddled, white bellied and in short all over white with a strong large Tail, and with Horns, or better without them: A Ram that answers these Marks, gives its Owner the greatest Assurance of his getting the best Lambs." Ellis then goes on to say that an ancient writer had been even more particular in setting out the points of a ram, but his own system of selection is perhaps of more interest here.

Ellis's enthusiasm for the Western breed was not confined to the ram. He prefers ewes of this breed also, "because they commonly come off sound layers of Ground; the West-Country Sheep from off their high dry Grounds, or Downs; and the *Hertfordshire* (which he also recommends) from off inclosed, gravelly, chalky, sandy and loamy Soils: and off Commons of the same Nature. And because they are not so apt to stray away, like the *English* pole, or the *Welch* or *Scotch* Sheep. . . ." In addition the ewes are likely to bring twin lambs. The ewe of this type which

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was preferred had "wide Shoulders, broad Loins, deep-bodied, short-legg'd, handsome-headed, with Horns not too big; the West-Country Ewe with a white Face, and white Legs, and the *Hertfordshire* Ewe with a speckled Face: of either be sure she is a good-coated one, I mean, that her Wool has a full white Curl; for there is more in this than most Persons are aware of."

These West-Country Sheep were the most popular not only in Hertford, but also in Buckingham, Bedford and Middlesex, according to Ellis. They were "the very best, for Soundness of Body, for living on our short Grass, for folding to dress our Land, for fattening on Turnips, for suckling House and Grass Lambs, for driving to and from our Fields and Commons, for not straying, and for yielding the very best Staple of Wool." There was a well-developed business in the hands of jobbers who visited Hampshire, Dorset and Wiltshire, to buy these sheep on the account of particular farmers or for resale in the local markets, the busiest of which was at Tring, where a sheep market was held every Friday.

The local Hertfordshire-bred sheep was of a larger size than the West-Country, but, like the latter, it was a horned sheep and had black spots on its face and legs, where the Western was white. They were not quite so large as the Oxfordshire, Leicestershire or Lincoln breed, but when thoroughly fattened, might weigh, "in neat Mutton, about sixteen Stone, at eight Pounds Weight to the Stone." They were not considered suitable "to get a Living on a very short Bite of Grass on Commons," where the smaller Western sheep would do well.

The Oxford was a polled sheep larger in carcass than either the Western or Hertford breed, and similar polled sheep were bred in Leicester, Lincoln and Cambridge, of a still larger size. These were brought up, fattened for sale, to the great Smithfield Market. The wool was very coarse and hairy, especially that of the Lincoln breed, which however carried the heaviest fleece in spite of its bare belly and legs. Unfortunately Ellis leaves his estimate of the carcass weight of this breed blank. He does, however, tell us that the meat was coarse grained, which all contemporary writers agree upon, and says that their joints were too great for small families eating while hot. These large sheep were also unsuitable for folding, because they took too long to fill their bellies on a short bite of grass.

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The Welch and Scotch sheep of the day were the hardest for living in a cold country on a short bite of grass. They were therefore very suitable for Downs and Commons. Large numbers were imported to the southern counties, where they were fatted for the market, but in Hertford and Buckingham they were not liked very much because they were wild and apt to straggle and run away if not under the care of a shepherd. If they were fed on a delicate grass, however, they were said to become as good as the famous breed that was then fed on Banstead Downs.

Interesting sidelights on the difficulties that confronted some of the farmers, whose holdings lay in the long narrow strips of the open fields, are given by some of the instructions for the training of sheep dogs. One of the necessities was to teach a dog "to side a flock." It was accounted a very serviceable trick for a dog to know because it kept along one side of the flock as the sheep were driving or grazing "along narrow Roads, Lanes, or other strait Places of Passage, for the greater Assurance of Sheeps not straying and doing Damage to green Wheat, or other Corn or Grass. And so well disciplin'd are some Dogs to this Notion that they'll keep along one Side of a Flock, in the Sheeps Face, for good Part of a Day together, and prevent their feeding on any Vegetable that is not for them." In another place he mentions that this particular ability is very useful when sheep are being driven or fed in the arable fields where the stubbles were next to growing crops and were not separated from them by hedges.

A good deal of information is supplied regarding the practice of suckling house lambs, a business then of some considerable dimensions, and widespread in the Home Counties, because there was a good sale for the meat in London. For this purpose Dorset ewes were bought, as they were reputed good twinners. The lambs were kept in the house and suckled twice daily, each ewe being suckled by lambs of three different ages. Ewes in milk were also bought in to act as foster mothers. The ewes were kept high on rich grazing of the then newly-introduced forage crops, clover, trefoil, sainfoin, turnips, and even on grain, and were grazed as close to the farmhouse as possible in order to conserve energy and milk. In addition to the milk of the ewes, the older lambs were given "dry meat" of various sorts, such as oatmeal mixed with powdered chalk, whole oats and chalk, pollard and chalk, blue peas, wheat

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flour and oats mixed, etc. The lambs were sometimes bled a little before going to market in order to improve the whiteness of the flesh.

The best synopsis of the contents of the book is that provided by the entry in *Agricultural Biography*. It runs: "In this volume the author enlarges upon the great value of turnips to the sheep farmer, and thinks it the most valuable plant yet known in agriculture. He describes well the drawing of the best store sheep after harvest to be fattened on turnips, and calls the cultivator of ground an 'afternoon farmer,' who does not grow large crops of turnips and rape for the use of sheep flocks. The feeding of turnips by hurdling the animals on the ground was as well done then as now, and is most correctly described. The folding of sheep on the summer culture of land is much recommended, and to be done by the store flocks. The suckling of fat lambs is amply described; the artificial foods given in troughs, as meals, pollards, and powdered chalks—the diseases and cures are not neglected, and the volume concludes with a notice of wool and the shearing of sheep; the value of skin, hoofs and horns."

This is a concise description of the contents of the book, but the modern reader will find much more in it than the actual didactic writing on its professed subject. Ellis was extremely discursive, and his anecdotes about and comments upon his brother farmers are quaint and piquant. One of his *obiter dicta* is to the effect that a lame shepherd and a lazy dog are the best attendants for a flock of sheep. His reason of course is good. They drive the animals leisurely, and give them due time for feeding in the places where the best living is found. This example gives the flavour of much that Ellis says. His book deserves notice if only because it was the first on sheep. It was also a practical work giving full details of much of the practice of the day, together with a great many theories based upon methods which were then new or just introduced in the most advanced and circumscribed districts. Perhaps therefore we shall have no hesitation in agreeing with Donaldson's dictum that Ellis by consequence of this work "occupies a niche of no low standing in the temple of agricultural fame."

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The Milk Marketing Scheme.—The Milk Marketing Scheme, which applies to England and Wales, has now been approved by Parliament and, in accordance with the Agricultural Marketing Act, 1931, it will be referred to the milk producers in England and Wales in order that they may decide, by a poll, whether the Scheme shall come into operation or not.

The Scheme thus enters a “suspensory period” to allow time for the milk producers to become registered with the Milk Marketing Board and for the poll of registered producers to be taken. Within the next few days producers will receive a registration form.

Every milk producer in England and Wales is entitled, on application at any time, to be registered with the Board, but it is important for producers to note that unless they register before the date specified in the notice which will accompany the registration form, they will not be entitled to vote on the initial poll. Producers should, therefore, make certain that their registration forms are filled in and returned to the Board before the date given in the notice, so that they may have an opportunity of voting on this very important question.

Unless the results of the poll show that not less than two-thirds of the registered producers voting, counting numbers and output, are in favour of the Scheme, it will lapse.

The Scheme provides for the constitution of the Milk Marketing Board, to be elected by the registered producers in England and Wales, and for the establishment of eleven provincial regions, each with a regional committee elected by the registered producers in the region. These regional committees are to advise the Board as to the working of the Scheme in the regions.

The classes of producers who will be exempted from registration, and consequently from the operation of the Scheme, are those—(a) who have not more than four milch cows (provided they do not sell milk by retail); and (b) who do not carry on the business of selling milk otherwise than to their servants for domestic consumption. *All other milk producers should register. Producers who are neither*

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registered nor exempt from registration will not be allowed to sell any milk.

The Board will have power to prescribe the form and the terms (including prices) of the contracts for the sale of milk by registered producers and, in particular, they may prescribe as a term of the contract that the purchase price shall be paid by the purchaser to the Board, that the contract shall be conditional upon its registration and confirmation by the Board, and that the Board shall be entitled to enforce, as agents of the producer, any provisions of the contract that the producer himself is entitled to enforce. The Board will also be able to prescribe the additional premiums which the registered producers shall be paid for graded milk, level deliveries and special services. Prices to be prescribed by the Board for the sale of milk for liquid consumption may vary in different districts and, in the case of milk for manufacture, according to the purpose for which the milk is used.

Producers who desire to sell milk by retail must obtain a retail licence from the Board, but the Board are not entitled to refuse a licence to any registered producer who applies for one unless he has previously held a licence which has been revoked.

In order to encourage a higher standard of production the Board may pay a bonus, called the "guaranteed quality premium" to registered producers who satisfy the Board that they are complying, and will continue to comply, with the conditions laid down by the Board for securing purity and good quality of milk. There will be a special register of these producers, who will be known as "accredited producers."

The fundamental principle of the Scheme will be the equalization of the proceeds of all sales of milk wholesale by the registered producers in each region, so that each producer will receive a "pool" price for his milk irrespective of whether it is sold for liquid consumption or for manufacture. By means of an adjustment, termed the Inter-Regional Compensation Levy, the regions having a high proportion of sales for liquid consumption will contribute towards the pool price in regions that sell milk largely for manufacture. The premiums for level deliveries, graded milk and special services, and the guaranteed quality premiums, will not be pooled, so that producers

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who earn these premiums will receive them in addition to the pool price. The producer-retailer will be required to play his part by making contributions equivalent to those of other producers.

It is obvious that an immense amount of detailed accounting work will be involved in the pooling arrangements, and that a little time must elapse before the necessary machinery can be set up. Accordingly, it has been provided in the Scheme that the pooling provisions shall not come into force until the Board prescribe, as a term of the contract, that the purchase price shall be paid to the Board.

When the pooling operations are in operation, any registered producer—unless he is in receipt of level delivery premiums—who has not been able to find a purchaser for his milk on the terms of the contract prescribed by the Board may, subject to certain conditions, require the Board to buy his unsold milk.

For the first year of the operation of the scheme, the Board will be under an obligation, before they determine prices or prescribe any terms of the contract which may affect prices, to consult with the organizations representing distributors, manufacturers and other purchasers of milk by wholesale, together with not more than three persons nominated by the Minister. In the event of the Board and the buyers being unable to agree as to prices, the Minister's nominees are empowered to fix the prices, and any prices so fixed will be binding upon the Board.

Copies of the Milk Marketing Scheme can be obtained from His Majesty's Stationery Office or through any bookseller, or from the offices of the Milk Marketing Board, at Thames House, Millbank, London, S.W.1.

Potato Marketing Scheme.—On July 19, 1933, certain farmers and merchants in Scotland, who held that their interests were being prejudiced by the provisions of this scheme, obtained an interim interdict in the First Division of the Court of Session in Edinburgh, prohibiting the Secretary of State for Scotland from proceeding further with the scheme. The interim interdict was recalled on July 20 on an express undertaking given by the Lord Advocate that the Secretary of State would not lay the draft scheme, either with or without modifications, before Parliament without notice to the complainers in time to enable them to

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renew their application for an interdict if they were so advised. The draft scheme in question is applicable in Great Britain.

Regulation of Meat Imports.*—It has been arranged that imports of chilled beef from South America into the United Kingdom during the first half of the current quarter (July to September) will be reduced by 10 per cent. and in the second half of the quarter, by $12\frac{1}{2}$ per cent. below the figures for the corresponding period of the standard year (July, 1931, to June, 1932).

In accordance with the Ottawa Agreements, the reduction in the imports of frozen beef, mutton and lamb from foreign countries in the current quarter will be increased from 15 per cent. to 20 per cent. below the figures for the corresponding quarter of the standard year.

National Mark Beef.—The number of sides (including quarters and pieces expressed in terms of sides) of beef graded and marked with the National Mark during April, May and June, 1932 and 1933, and the three weeks ended July 22, 1933, were as follows:—

LONDON AREA.				
<i>Period.</i>	<i>London.</i>	<i>Birkenhead.</i>	<i>Scotland.†</i>	<i>Total London Supplies.</i>
April, 1932 ..	7,867	838	5,541	14,246
„ 1933 ..	5,719	2,070	5,195	12,984
May, 1932 ..	7,119	440	4,928	12,487
„ 1933 ..	7,338	1,625	5,619	14,582
June, 1932 ..	5,282	1,080	4,251	10,613
„ 1933 ..	5,976	721	5,032	11,729
Three weeks ended				
July 22, 1933 ..	3,757	946	2,877	7,580

BIRMINGHAM AND YORKSHIRE AREAS.				
<i>Period.</i>	<i>Birmingham.</i>	<i>Leeds.</i>	<i>Bradford.</i>	<i>Halifax.</i>
April, 1932 ..	3,646	1,754	1,669	351
„ 1933 ..	3,832	1,817	1,494	371
May, 1932 ..	3,989	1,814	1,742	339
„ 1933 ..	4,539	2,293	1,807	475
June, 1932 ..	3,494	1,526	1,283	258
„ 1933 ..	3,349	1,799	1,372	334
Three weeks ended				
July 22, 1933 ..	2,648	1,184	976	255

In the three months ended June 30, 38 consignments (229 cattle) were sent direct from farm to abattoir for sale by dead-weight and National Mark grades, as compared with 4 consignments (40 cattle) sent during the correspond-

* For reference to previous arrangements see the issue of this JOURNAL for May, 1933, page 237.

† Figures include Scotch sides graded and marked in London.

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ing period of 1932. Most of the consignments were sent to Birmingham, owing principally to the higher quotations made at that centre for light-weight cattle.

Sale of Lambs by Dead-weight and Grade.—Following on successful trials of the method of sale of fat lambs by dead-weight and carcass grade, a large-scale experiment is being conducted at Manchester in conjunction with the North Wales Marketing Committee of the National Farmers' Union. Arrangements have also been made for experimental consignments to be dealt with at the beef-grading centres—Birmingham, Leeds and London. The first consignment of lambs under the scheme was received at the London Central Meat Markets on June 15. Up to July 22, 4,761 lambs had been sent to Manchester and 316 lambs to other centres.

The procedure is similar to that followed in the scheme for the direct consignment of cattle from farm to abattoir for sale on a dead-weight and National Mark grade basis. Details of proposed consignments are forwarded by the senders to the Ministry's Head Grader at one of the wholesale meat markets. The details comprise the number of lambs on offer, the breed or "cross," their approximate average live weights, and the approximate date on which they could be despatched.

On receipt of this information, the Head Grader obtains, from a number of wholesale carcass butchers, quotations based on the quality grades—"Select," "Prime" or "Good"—and on the dead-weight per lb. (sinking the offal). The value per lb. of a lamb carcass depends on a combination of the grade and total weight, and, as a rule, the lighter the carcass the higher the value per lb.

The most favourable quotation is then forwarded to the farmer, and, if this is satisfactory, the farmer immediately notifies the Head Grader, who then issues instructions as to date of loading and how the lambs are to be marked. The wholesaler arranges to have the animals met at the goods station of arrival. After slaughter, the Ministry's Grader grades the carcasses and supervises the weighing. He then issues a certificate stating the grades, dead-weights and the amounts realized at the quoted prices and forwards it to the sender. The wholesale butcher pays the sender on the basis of this certificate, usually within 48 hours of the lambs being pitched on the wholesale market.

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The consignor bears the cost of carriage and the lambs are at his risk until they reach the goods station of arrival. The only deduction from the net amount realized as stated on the certificate is the sum of 3d. per lamb (whether graded or rejected as ungradable) to cover grading costs. This amount is deducted by the wholesaler and paid to the Ministry.

The advantages of the direct-consignment method of sale are as follows:—

- (i) The forward quotation ensures for the producer a guarantee of the full current market values and, of equal importance, the option of accepting or refusing an offer before the lambs have left the farm.
- (ii) The best feeders stand to gain, since well-finished lambs will show a smaller percentage loss from live-to dead-weight than others.
- (iii) Direct consignment from farm to abattoir eliminates or greatly minimizes the loss due to deterioration in transit. Lambs are particularly susceptible to such deterioration.
- (iv) There is no uncertainty as to the transaction. After quotations have been accepted, the certificate issued by the Ministry's Grader is an independent guarantee of the dead-weight, grade and amount realized.
- (v) Direct sale on a carcass-grade and weight basis helps the producer to appreciate the exact demands of the consumer.

Full particulars of the experimental scheme are given in Marketing Leaflet No. 46, copies of which can be obtained free of charge, on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

National Mark Vegetables.—The National Mark Schemes for bunched carrots and green peas were introduced on July 5 and over 20 applications for enrolment have already been received. Authority to apply the Mark may be granted to growers of green peas with an estimated annual output of not less than 500 bags, each containing 40 lb. actual weight of peas (in pods), or the equivalent thereof, and to growers of bunched carrots with an estimated annual output of carrots grown under glass of not less than 1,500 bunches (or 3,000 half-bunches), or with a

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minimum area of $\frac{1}{4}$ acre devoted to carrots grown in the open for bunching.

Approved associations may also be authorized in these schemes. There is no minimum-output qualification in the case of individual growers who are members of such associations.

National Mark Schemes for brussels sprouts, celery, kidney beans and radishes are in course of preparation and details of the proposed grades will shortly be available.

National Mark Canned Fruit and Vegetables.—In the April, 1933, issue of this JOURNAL, reference was made to the recommendations of the National Mark Canned Fruit and Vegetables Trade Committee regarding the size-grades of fruit, density of syrup and weight of fruit in cans. The inspections, that have been carried out by the Ministry's Officers since the opening of the canning season, indicate that these recommendations have been appreciated by authorized canners and that every effort is being made to give effect to them so as to ensure that only first-class produce is sold under the National Mark.

An important factor in securing uniformity of the canned product, and in safeguarding the reputation of the National Mark, is the adequate supervision of canning operations. At the request of the Trade Committee, special attention is being given to this point by the Ministry's Officers during their inspection of factory premises. Control of quality is, however, mainly secured through the examination of samples drawn from all factories at intervals during the canning season. The results of the examination of these samples are immediately communicated to authorized canners, and attention is directed to points where improvement can be effected. Details of samples which are found to be unsatisfactory are circulated at short intervals to a Sub-Committee of the Trade Committee. If, after examination of a number of samples, there is still a doubt as to the quality of any pack, further samples are inspected by the Sub-Committee, which reports its findings to the Trade Committee, without indicating the canner concerned, and recommends what action should be taken. If necessary, the authorized canner is asked to appear before the Sub-Committee. If the Sub-Committee finds it necessary during the season to interview an authorized canner on more than one occasion on the subject of unsatisfactory packs, it

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reports the case, under the canner's name, to the Trade Committee, which considers whether the case is one which should be reported to the National Mark Committee for disciplinary action. A similar procedure is adopted in the case of samples obtained from retailers, of which a widespread examination is made later in the season.

Inquiries received from various parts of the Empire as to National Mark canned fruits and vegetables indicate the reputation which National Mark packs have gained, and how important it is that produce exported under the Mark should be well up to the prescribed standards.

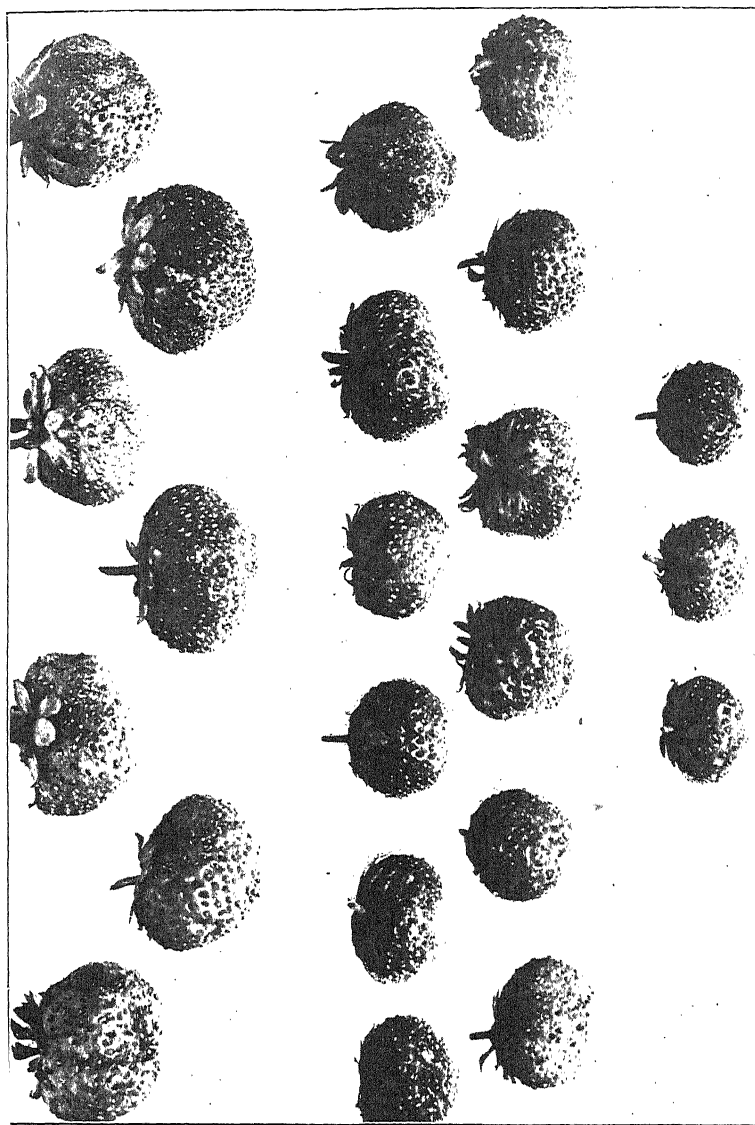
Home-Grown Strawberries: Analyses of Specimen Packs Received in Covent Garden Market.—In 1932, an investigation into the methods adopted by growers in the grading and packing of strawberries (other than National Mark packs) was carried out by the Ministry with special reference to the extent to which "topping" was prevalent. On that occasion, 19 samples, each of reputed 2 lb. net weight, were taken in Covent Garden Market, London. Of these, 2 only were found to have been "topped," 6 were slightly under weight and 3 were under weight to the extent of 2 oz. or more. Eight of the baskets contained graded fruit. Of the individual strawberries in the 19 samples, 60 per cent. were below $\frac{1}{4}$ oz. each—i.e., the minimum weight of the statutory *Selected* grade—whilst many were malformed.

Having regard to the necessity for increased efficiency in the marketing of horticultural produce, the investigation was repeated this year on a somewhat larger scale.

Thirty-six baskets of non-National Mark and 4 of National Mark strawberries typical of the average run of the fruit on offer were purchased at Covent Garden Market. These had been consigned by 11 different growers and, in most instances, reputed 2-lb. baskets were obtained.

From the summary of the results of the analyses on page 449, it will be seen that, with the exception of 4 baskets G1 to G4 (which, however, were under weight), none of the non-National Mark samples came up to National Mark quality standards. The quality of the contents of 4 baskets—viz., E1 to E4—was very poor. The berries were malformed and exceptionally small, and the packs had been topped.

Baskets H1 to H3 contained strawberries probably of



7 berries
over $\frac{1}{2}$ oz.
Total Weight:
5 oz.

12 berries
over $\frac{1}{2}$ oz.
Total Weight:
 $4\frac{1}{2}$ oz.

3 berries
under $\frac{1}{2}$ oz.
Total Weight:
 $\frac{1}{2}$ oz.

Unblemished:

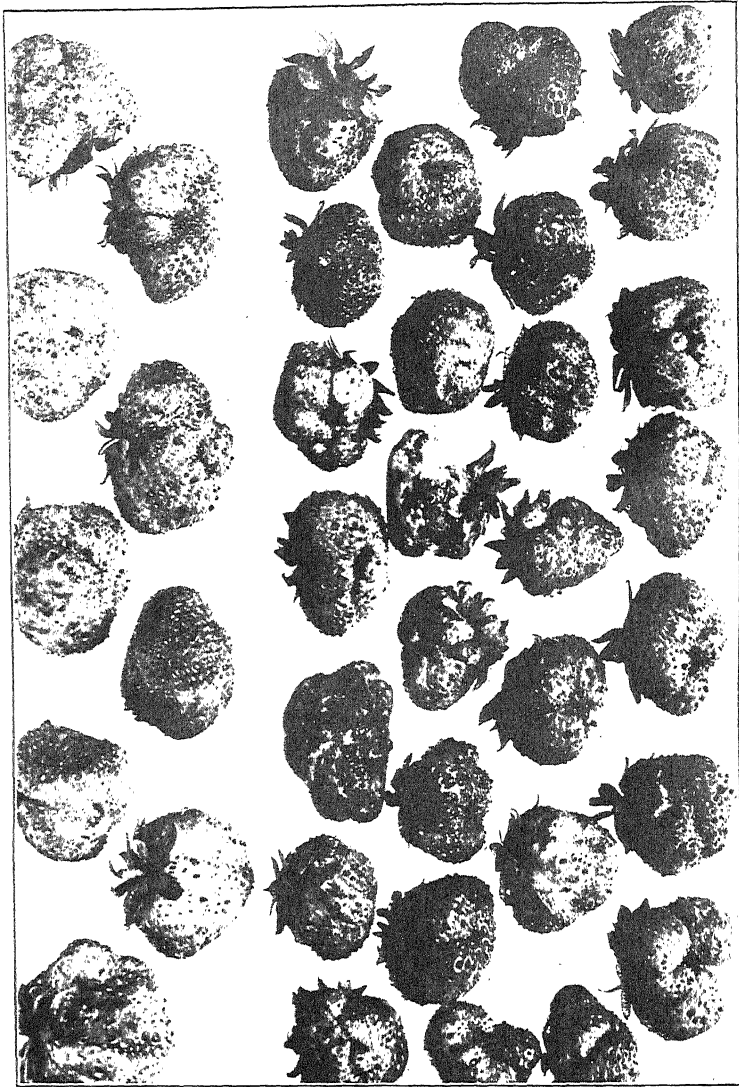
EXAMINATION OF STRAWBERRY PACKS, 1933. ANALYSIS OF SAMPLE H₃ (on this and following pages).
3 lb. Chip—net weight, 2 lb. 13 oz.

Blemished.

Malformed.

9 berries
over $\frac{1}{4}$ oz.
Total Weight:
5 oz.

28 berries
over $\frac{1}{4}$ oz.
Total Weight:
10 oz.



SAMPLE H 3 (Contd.)



Malformed.

31 berries
under $\frac{1}{4}$ oz.
Total Weight:
6 oz.

Blemished.

Unripe.

9 berries
over $\frac{1}{4}$ oz.
Total Weight:
3 oz.

3 berries
under $\frac{1}{4}$ oz.

SAMPLE H 3 (Contd.)

Blemished.

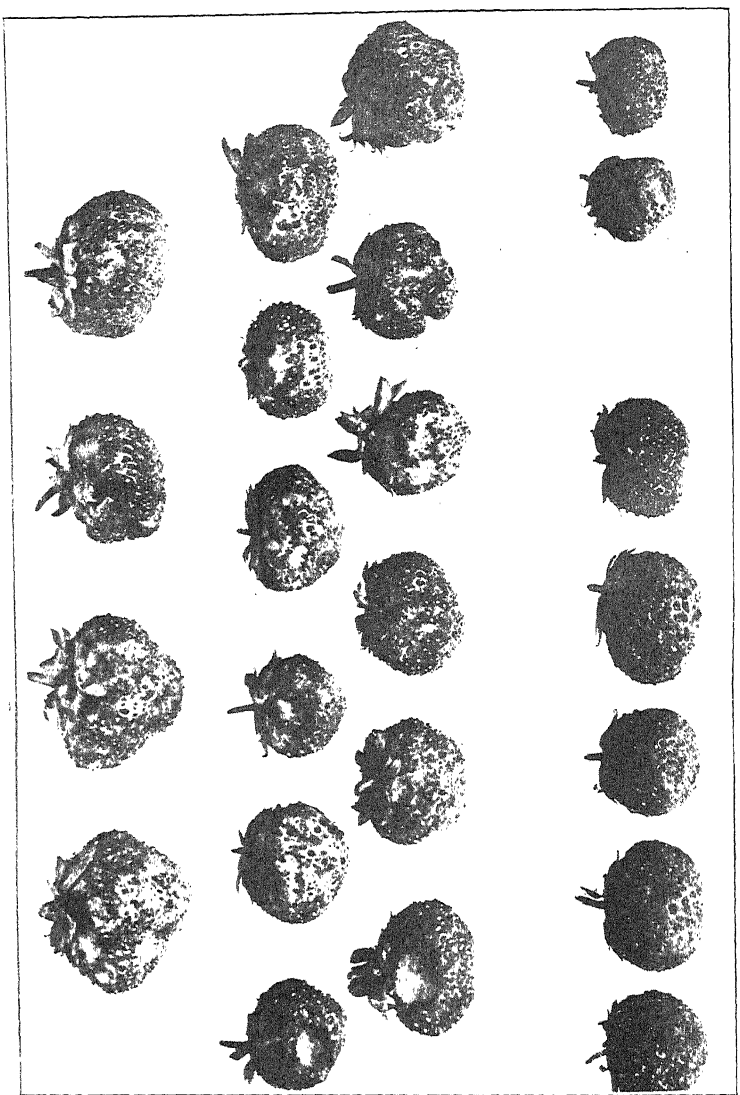
Sling Damaged.

4 berries
over $\frac{1}{4}$ oz.
Total Weight:
 $2\frac{1}{2}$ oz.

12 berries
over $\frac{1}{4}$ oz.
Total Weight:
4 oz.

5 berries
over $\frac{1}{4}$ oz.
Total Weight:
2 oz.
2 berries
under $\frac{1}{4}$ oz.
Total Weight:
 $\frac{1}{4}$ oz.

Dirty.



SAMPLE H 3 (Contd.)

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EXAMINATION OF STRAWBERRY PACKS, 1933:

SUMMARY OF RESULTS

Sample No.	Price	Net weight	No. of berries		No. of berries below Selected grade	Whether graded	Remarks
			Extra Selected grade	Selected grade			
Non-National Mark Samples							
A	1 0 10	2 0	3	25	135	No	Fair but small
	2 0 10	1 15	4	45	83	No	" " "
	3 0 10	2 0	1	31	133	No	" " "
	4 0 10	2 1	3	39	104	No	" " "
	5 0 10	1 15	1	35	111	No	" " "
B	1 1 0	1 14	10	33	53	No	Poor " "
	2 1 0	2 3½	4	46	79	No	"
	3 1 0	2 1½	2	39	101	No	"
	4 1 0	2 3½	1	42	103	No	"
	5 1 0	1 14	1	32	96	No	"
C	1 1 6	2 15	15	71	68	No	Good
	2 1 6	3 1	11	67	94	No	Fair
	3 1 6	3 1	12	63	78	No	Good
D	1 0 10	2 0½	—	18	149	No	Fair
	2 0 10	2 2	—	12	187	No	" } Some topping
	3 0 10	2 3	2	17	164	No	"
	4 0 10	2 3½	—	18	160	No	"
E	1 0 8	1 14	2	1	276	No	Very poor
	2 0 8	1 15	—	4	331	No	" " } Topped packs
	3 0 8	2 1	—	14	186	No	"
	4 0 8	1 14	—	25	192	No	"
F	1 0 8	1 12	—	36	127	No	Fair
	2 0 8	1 13	—	40	99	No	"
	3 0 8	1 13½	—	19	187	No	"
	4 0 8	1 13¾	—	14	159	No	"
G	1 1 6	1 12	20	40	3	Yes	} Except as to weight, very good
	2 1 6	1 11	10	52	18	Yes	
	3 1 6	1 13	22	50	—	Yes	
	4 1 6	1 13	17	40	—	Yes	
H	1 1 0	2 15	7	36	91	No	} Extremely poor. Badly topped packs
	2 1 0	2 13	17	18	71	No	
	3 1 0	2 13	7	12	110	No	
J	1 1 0	2 1	1	38	100	No	Fair
	2 1 0	1 15½	—	19	152	No	Poor
	3 1 0	1 13½	1	28	123	No	Fair
	4 1 0	2 0¼	1	16	143	No	"
National Mark Samples							
K 1 (Extra Selected)	1 9	2 2½	39	16	—	Yes	Good
K 2 (Extra Selected)	1 9	2 1	24	34	5	Yes	Fair
L 1 (Selected)	1 3	2 2	17	70	—	Yes	Good
L 2 (Selected)	1 3	2 1	30	61	—	Yes	"

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the variety Madame Kooi. The fruit was very poor and consisted of unripe, malformed and slug-eaten berries. These packs, also, had been topped. A photograph of this sample is reproduced on the accompanying inset. While this sample must not be regarded as in any way representative and is in fact, one of the worst ever seen on the market, it indicates the danger to the reputation of home produce which may be caused by unstandardized methods of packing. Even a small minority of careless or dishonest packers may do great harm to the industry as a whole unless there is some readily recognizable method of distinguishing their packs.

The results of the analyses of the non-National Mark packs may briefly be summarized as follows:—

Topping.—9 samples were topped, the quality of the berries being very poor.

Grading.—There was little evidence of any serious attempt by growers to grade the fruit sent to market.

Size.—The proportion of berries below National Mark standards was definitely greater this season than last. Climatic conditions this year have not, however, favoured strawberry production, and crops have been definitely light and small in size.

Quality.—The quality could only at best be considered fair.

The 4 baskets of National Mark strawberries proved to be satisfactory, and, whilst the *Extra Selected* fruit contained what might appear to be an excessive number of berries below $\frac{1}{2}$ oz., they were all border-line cases and could be considered reasonably adequate for the grade.

National Mark Honey.—The conditions of authorization of individual packers of National Mark honey have been amended to permit of a minimum annual output of 1 ton instead of 2 tons, as hitherto.

It has also been decided to permit a maximum sucrose-content in the honey of 5 per cent. instead of the present $2\frac{1}{2}$ per cent. Amended regulations under the Agricultural Produce (Grading and Marking) Acts, 1928 and 1931, will shortly be made.

National Mark Wheat Flour.—The Agricultural Produce (Grading and Marking) (Wheat Flour) Regulations, 1933, will become operative on September 1, 1933. These regulations provide for revised grades in place of those prescribed in the Regulations of 1929. As from September, 1933, the National Mark scheme will embrace grades for All-English (Wholemeal), All-English (Straights), All-English (Patents) and All-English (Self-Raising) flour.

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Where the meal or flour is made exclusively from wheat of "Yeoman" varieties, the word "Yeoman" may be included as part of the grade designations.

National Mark Scheme for Cheshire Cheese.—Of the total consumption of cheese in Great Britain, only about a quarter—including both farm and factory output—is home-produced. Imports amount to about 3 million cwt. a year and are, in the main, well standardized as regards quality. A higher general standard of quality is required in the home product if it is to withstand to best advantage the force of this competition. The Agricultural Produce (Grading and Marking) Acts, 1928 and 1931, afford facilities by which the standardization of quality may be promoted and the National Farmers' Union have requested the Ministry to introduce, under those Acts, a National Mark scheme for cheese. As the simultaneous application of the grading principle to all varieties of home-produced cheese would present administrative difficulties, it has been decided, in the first instance, to limit the application of the National Mark to Cheshire cheese, the most important home-produced variety. An informal Trade Committee has been set up for the purpose of advising the Minister and the National Mark Committee on the administration of a National Mark Cheshire Cheese Scheme. Professor H. D. Kay is Chairman of the Committee, the other members of which are Messrs. H. Edwards, B. W. Furber, T. C. Goodwin, W. H. Hobson, E. H. Jackson and J. Robinson.

Grade designations and definitions of quality for Cheshire cheese have been approved by this Committee and statutory effect thereto has now been given by the Agricultural Produce (Grading and Marking) (Cheshire Cheese) Regulations, 1933. There are two grades in the scheme, viz., *Extra Selected* (minimum age at time of grading, 28 days) and *Selected* (minimum age 14 days).

Authority to apply the National Mark may be granted to (a) farm cheese-makers and (b) factory owners or other large-scale manufacturers of Cheshire cheese. As regards farm cheese, authority to apply the Mark may be granted only to farm cheese-makers who are registered members of an authorized association, no quantity qualification being required.

Grading Procedure.—The grader of farm cheese will select and examine one cheese (or more at his discretion)

from each day's output, and if the sample so examined accords with the definition of quality applicable to cheese of its age, he will mark one of the caps of each cheese by means of a grade-stamp bearing the appropriate grade-designation and the date of grading. Only farm cheese so marked will be eligible to have the National Mark applied to it.

Application of the National Mark.—Registered members of an authorized association will apply the National Mark by means of a "National Mark" stamp bearing (1) the National Mark design or (2) the National Mark design incorporated in the registered trade-mark of the association in a manner approved by the National Mark Cheese Trade Committee.

All stamps bearing the National Mark design will be issued to authorized makers by or on behalf of the Ministry, on payment and subject to prescribed conditions.

Authority to apply the National Mark to factory cheese may be granted to factory manufacturers of Cheshire cheese who conform with the requirements of the scheme. In general, the conditions applicable to authorized factory manufacturers are similar to those applicable to farm cheese-makers.

Full particulars of the scheme are contained in Marketing Leaflet No. 43, copies of which may be obtained, free of charge, on application to the Ministry.

A Record of Achievement for Egg Producers.—The Ministry has revised and re-issued its leaflet (Marketing Leaflet 6h) entitled *The National Mark: A Record of Achievement for Egg Producers*. The leaflet discusses the problem facing the egg producer, with keen competition from imported supplies on the one hand and increasing home production on the other, and emphasizes the importance of developing the sale of tested and graded eggs under the National Mark in the populous areas where imported eggs have hitherto enjoyed such a large share of the trade, but where National Mark eggs are now making a real impression. Striking figures are given with regard to the expanding output of individual packing stations and of the stations as a whole, figures which indicate in unmistakable fashion that the National Mark grades have come to stay as part of the system of egg marketing in this country. The effects of the National Mark egg scheme in stimulating improvements in marketing technique is touched upon, and its influence upon prices discussed.

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Copies of this leaflet may be obtained, free of charge, on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1,

Overseas Interest in National Mark Development.—At the request of the New Zealand Delegates to the Monetary and Economic Conference, arrangements were recently made for the New Zealand Prime Minister (the Right. Hon. G. W. Forbes, M.P.), the New Zealand Minister of Education, Industries and Commerce (the Hon. R. Masters, M.L.C.), and members of their staff to study the working of the National Mark schemes for beef and eggs. Visits were paid to the beef-grading centre at Islington and to a London egg-packing station where the methods of operating both schemes were explained and demonstrated.

Marketing Demonstrations.—The series of demonstrations dealing with the National Mark movement which have been given by the Ministry at Agricultural Shows this season will be continued during August, when the following Shows will be attended:—Royal Lancs. (Salford), August 3-7, Harrogate, August 7-8, Craven Arms, August 12, Denbigh and Flint (Mold), August 17, Southport Flower Show, August 23-25, Anglesey (Llangefni), August 31, and Monmouthshire (Monmouth), August 31. The exhibits illustrate all the existing National Mark Schemes, those more recently introduced—e.g., for soft fruits, vegetables, jam and Cheshire cheese—being dealt with in detail. At the Denbigh and Flint Show and at the Southport Flower Show, a working National Mark egg demonstration will be included, showing testing, grading and packing.

Amendments to the Hops Marketing Scheme, 1932.—The period for lodging objections to the proposed amendments to the Hops Marketing Scheme, 1932, expires on August 4. In the event of a Public Inquiry being held into objections, arrangements will probably be made to hold the Inquiry during September.

The Hops Marketing Board have advised registered growers to produce all the hops of good quality that they can this season. The Board anticipate that the reduction of the beer duty at home, and the termination of prohibition in the United States will result in a demand sufficient to absorb all the good hops that can be grown in England this year. The Board add that they do not consider that the

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present favourable position is likely to continue beyond the present season. They intend therefore to proceed with the projected amendment of the scheme.

Wheat Act, 1932.—Certified sales of home-grown millable wheat up to and including July 14, 1933, amounted to 19,846,250 cwt.

Irish Free State: Agricultural Produce (Cereals) Act, 1933.—The Agricultural Produce (Cereals) Act, 1933, which was passed by Saorstát Éireann on May 4, 1933, brings into effect the policy of the Irish Free State Government in regard to the control of the cereal industry.

Under the Act, the Government may pay bounties to wheat growers and subsidies to inland millers, and may regulate the import trade in flour, wheat, bread, maize and feeding-stuffs and the export trade in wheat offals and other feeding-stuff products. The Act involves the registration and licensing of flour importers, distillers, wheat importers, wheat dealers, wheat growers, maize millers, maize importers and manufacturers of compound feeding-stuffs, and the establishment of an inspection system.

The cost of the bounties and subsidies payable under the Act and all expenses of administration are to be paid from State funds.

Bounties to Wheat Growers.—Registered growers of wheat will receive, in respect of their sales of millable wheat, a bounty which is arrived at in the same way as the deficiency payment under the United Kingdom Wheat Act, 1932, namely, the difference between the average selling price and a "standard price." The bounties are paid on the strength of wheat certificates which are issued only in respect of wheat sold to licensed or registered persons. Three wheat-sale seasons in each cereal year are prescribed, namely (a) from August 1 to December 15; (b) from January 15 to April 15; and (c) from May 1 to July 31; and a standard price has to be fixed and the average price calculated for each season. The standard seasonal prices for the first two cereal years are laid down—42s. 3.6d. per quarter for the first season and 45s. 0d. for each of the remaining seasons. Thereafter, the standard price is to be fixed by Order, which may apply to one or several seasons, but the Order must be made not less than two years before the commencement of the sales season to which it relates.

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The Executive Council have power subsequently to increase, if necessary, the amount of the standard price for any season.

A wheat importer may only sell imported wheat under licence or subject to special conditions; similar provisions attach to the resale of home-grown millable wheat.

Regulation of the Milling Industry.—No person may mill wheat except under licence, though special permits to mill home-grown wheat may be granted to persons not holding millers' licences. With the granting of the licence, the Minister of Industry and Commerce allots to the miller the quota of wheat he is required to mill. (This quota can be varied by subsequent Orders.) If he mills less than 90 per cent. of his quota, he is liable to penalty. If he mills in excess of his quota, he must pay to the State a sum calculated at the rate of 3s. *od.* for every 400 lb. of wheat milled in excess.

A miller is also required to mill a certain proportion of home-grown millable wheat. As soon as possible after the commencement of each cereal year, an estimate has to be made of the quantity of such wheat that will be available for sale in that year, and an Order, which may subsequently be varied, will then be made requiring that, of the total amount of wheat to be milled, a certain percentage shall be home-grown wheat. Each licensed miller must mill a quantity corresponding to the national percentage, unless he can arrange, with the Minister's consent, for another miller to take over his quantity.

The Minister may attach special conditions to the grant of a milling licence to a person who is not an Irish national or to a corporate body which is not Irish-owned.

Subsidy Payable to Inland Millers.—A subsidy, determined by the Minister of Finance after consultation with the Minister of Industry and Commerce, not exceeding 1s. *od.* per 400 lb. of wheat milled, may be paid in respect of wheat milled at an inland mill—that is to say, mills situated outside a radius of five miles of Dublin, Cork and Limerick. The subsidy may be varied according to district.

Regulation of the Grain Trade.—Reference has been made to the extensive system of registration which is to be set up under the Act. This is consequent upon the system of control under which no person may import wheat unless he is licensed; no person who has bought certified home-grown millable wheat may re-sell such wheat except to a

MARKETING NOTES

registered or licensed person; no compound feeding-stuffs may be manufactured except by registered or licensed persons; and no unlicensed person may import flour, bread, buns, biscuits, etc., or wheat, maize, oats, hay and straw or any scheduled feeding-stuffs.

The sale of maize meal is prohibited unless the meal is intended for human consumption, or sold wholesale under licence by a registered miller, or forms part of a maize-meal mixture or of a compound feeding-stuff containing a maize-meal mixture.

Maize-meal mixture must comply with certain specifications as to its components and must not contain more than prescribed percentages of fibre and moisture. For the present, 15 per cent. of home-grown cereals must be incorporated in maize-meal mixtures.

The exportation, save under licence, of wheat offals and other products capable of being used as feeding-stuffs for animals may be prohibited.

By an Order made by the Minister of Industry and Commerce and the Minister of Agriculture, the Act became operative, so far as the control and regulation of wheat milling is concerned, on May 31, 1933, and as regards the other provisions on May 24.

AUGUST ON THE FARM

H. G. ROBINSON, M.Sc.,

Midland Agricultural College, Sutton Bonington.

Corn Harvest.—The tendency to advance the date of hay harvest does not apply to cereals. With these, the exact date of cutting depends upon the stage of maturity, which may vary according to the variety, the type of manuring, and the season. Appearances indicate that corn harvest will be early this year—a natural outcome of the spell of hot, fine weather experienced in early summer. This has been, on the whole, a good season for cereals, especially on the richer soils. On less fertile soils straw is rather short, and consequently it has been a good year in which to observe manurial effects. Straw development, indeed, is one of the most significant problems under intensive farming conditions: so much so, that yielding capacity is secondary to resistance to lodging. For this reason it is essential that plant breeders should concentrate on standing powers of the crop as much as on yielding capacity.

There are certain well-defined rules by which to determine the correct stage at which cereals should be cut. With *oats*, it is desirable that the field should present a yellow colour, but it is an advantage if a slight tinge of green persists. If oats are cut when the straw is completely ripe, there is risk of a higher proportion of shed grain; if they are cut on the green side, however, there is danger of the grain being badly filled, and that there will be a lengthy ripening period in the stook. The commonest fault is that of allowing the crop to reach the over-ripe stage, for apart from the possible loss of grain, the straw is then reduced in value for feeding purposes. The condition of the grain at the correct stage of cutting is that it should be plump, but not hard.

With *wheat* it is customary to find most of the varieties maturing about the same time. This is one of the problems that have confronted the pioneers of mechanized wheat growing in this country: with a large area to harvest it has been found difficult to cover the ground at the most ideal stage. The condition of the grain is usually the index as to the correct stage for this crop. The ears should carry well-filled grains that are reasonably solid if cut with a knife. Wheat sheds its grain very readily in the over-ripe stage, a

AUGUST ON THE FARM

fact that many realized after the 1932 harvest when so many badly laid crops were cut after their normal time. If wheat is cut prematurely, the damage is seen in small, shrivelled grain.

As regards *barley*, considerations of malting quality affect the stage at which it is normally harvested. Not only is it desirable that the grain should be plump, but since evenness of sample and germination capacity count for much, it has been laid down by practice that barley should be quite ripe when cut. This means that both straw and grain alike have parted with their green colour.

The cutting of corn is now normally done with the aid of the self-binder. The utilization of tractors fitted with power take-offs, in place of horses, is a means of speeding up the rate of harvest work, while the development of self-binders with a cutting bar of up to 10 feet wide has proved a valuable means of dealing with long-strawed crops, as well as crops that have lodged.

Combined harvester-threshers are principally of interest to the specialized cereal-growing farms, on which they have given very satisfactory results. Their use necessitates the availability of a grain-drying plant, and ample granary space for storage purposes. Differences of opinion exist as to the length of stubble that may suitably be left at the time of cutting. This is to some extent dependent on the value of the straw, although in the old days a long stubble was held to signify lazy farming. In general the self-binder leaves a longer stubble than the old horse-reaper. It may be affirmed, however, that a stubble of medium length affords a certain amount of shelter to young grass and clover, and that from the nutritive viewpoint, the basal portion of the stem is least valuable when the straw is employed for feeding purposes. Stubble cleaning is more easily accomplished with a close stubble.

The length of time necessary for the drying out of cereals in the stook depends largely on the prevailing weather conditions. Quicker drying results if the crop is dry at the time the sheaves are tied up by the binder, and if the butt ends are free from weed plants or grasses and clovers. The greatest care is necessary as regards oats and barley. If weather conditions are unsatisfactory it is necessary to move the stooks fairly frequently, to encourage more rapid drying and avoid sprouting. Bad weather may seriously affect the appearance of the grain, though if ordinary

AUGUST ON THE FARM

precautions are taken the germination capacity is not impaired. This was evident from the experiences of the 1932 harvest, when many badly-discoloured samples of oats were on the market and which many buyers thought were over-heated in the stack until they were satisfied to the contrary as a result of the germination tests.

If it is necessary to exercise care in securing the crop in a dry state for carrying, it is equally necessary not to neglect adequate protection for the crop when stacked. The Dutch barn is generally considered to be a wise investment for corn crops, and it is probably sounder practice to utilize cover of this kind for straw crops than for hay, if barn space is limited. If stacks are built, these should be roughly covered with battens of straw until it is convenient to have them properly thatched.

Stubble Cleaning.—The more general use of tractors is making it possible to consider methods of keeping land clean without resorting to the established routine customs. In this sense the importance of stubble cleaning is being increasingly appreciated, though in point of fact, it is largely a revival of a time-honoured practice. In the report on the Agriculture of Derbyshire (1813), drawn up for the old Board of Agriculture, reference is made* to the use of a paring plough for wheat and other stubbles. By this means the roots of weeds, etc., were cut, the ground being then harrowed and raked, and the resulting collection either carried off to bed-down fold yards or burnt on the field. It is pointed out that this custom induced weed seeds to germinate, and thus future cleansing was simplified. The modern practice of shallow ploughing or using a cultivator fitted with broad shares accomplishes a similar result, though it is sometimes found difficult to penetrate stubbles that are very much baked, until they have been softened by rain.

The Ewe Flock.—August is an appropriate month in which to review the position of sheep-breeding in the light of future requirements. The problem for these days is how to render sheep-farming as foolproof as possible. Fortunately the observation of certain common-sense principles makes it possible to invest sheep-farming with a

* County Reports of the old Board of Agriculture: Derbyshire, Vol. II., 1813, pp. 124, 131, 406.

AUGUST ON THE FARM

measure of certainty as far as results are concerned. Overstocking is probably the outstanding point to avoid if good results are desired, chiefly because of the interference with the other types of live stock carried and the tendency to increase the risk of parasitic troubles to which sheep are specially subject. It is impossible to lay down hard-and-fast rules as to the best number of sheep that grass land should carry, but it is desirable to realize that the number is best determined not so much by the area available for them, as by the ability to devote adequate attention to them. As a rule a heavy concentration of breeding ewes is not popular on a dairy farm, since milch cows do not give their best results if they have to share the grazing with a large head of sheep. For this reason some dairy farmers prefer not to keep a breeding flock, but buy-in weaned lambs in late summer to be fattened off the grass and other "keep" before the commencement of the next grazing season. A breeding flock need not be a handicap on a dairy farm if kept within the capacity of the farm. Scope is naturally increased where both arable and grass land are available, while the system of long leys, so popular in the northern counties, has a special claim on the attention of flock owners. The existence of good fences so that fields can be rested from sheep is another essential of successful management. Wherever possible an effort should be made to rest for the winter such land as the ewe flock requires at lambing time and after. Stale or sheep-sick ground is not calculated to give young lambs a good start in life.

Many qualities are now demanded of the modern breeding ewe. Thus she must have inherent hardiness, high fecundity, good nursing properties and a capacity for producing lambs that mature early. Cross-breeding usually favours these requirements, and a wide choice of suitable types exists. Particularly marked is the growing popularity of breeds or crosses that have been raised under conditions where the law of the survival of the fittest has operated for generations—a feature that applies to most mountain and heath-going breeds and the crosses from such ewes. The commercial significance of some of these qualities is being rapidly appreciated by farmers of lowland sheep, where in the past there has been a tendency to overlook such points as fecundity, milking properties and hardiness. All these can be associated with a breed as a result of careful breeding, but in the case of heath types it is the fruit of

natural selection. The crop of lambs can be materially increased by good management. Thus it has been established that the liberal feeding of ewes on forage crops, corn stubbles or concentrates a fortnight or so before mating results in improved fecundity. This practice of "flushing" is always sound wherever sheep are kept under good conditions.

For most fat-lamb purposes the ram is selected from a Down breed. The individual ram is probably of much more importance than the breed. Thus there is a marked difference in the maturing properties of animals within the same breed. If fat-lamb production is the object, then a ram should be purchased as a lamb, which shows from its back and tail development at an early age that it has the qualities to be desired in the progeny.

Pneumatic Tyres for Farm Vehicles.—The introduction of pneumatic tyres for farm carts by the Dunlop Rubber Company has been attended by highly successful results. The award of a silver medal by the R.A.S.E. and a certificate of performance by the Ministry of Agriculture's Agricultural Machinery Testing Committee has served to confirm officially the private tests that had been previously made. The writer has had a pneumatic-tyred cart in use since last autumn, and it has proved a most excellent acquisition. Two things are particularly valuable, viz., the reduction in draft by comparison with ordinary wheels and the low loading character of the cart. It is possible that the question of draft is materially aided by the use of roller bearings as part of the equipment. The cart in question was designed to be as low loading as possible, and the object was accomplished by the use of steam-curved shafts. The main use to which this cart has been put has been the carting out of manure from the cowsheds to the field. For this purpose it has been a big improvement over the high-bodied vehicle previously used, especially as the cart is drawn direct through the cowshed. The freedom from jolting has also meant that there has been less splashing of wet manure over the sides when being carried to the field. Equally valuable is the ability of this type of wheel to go on wet grass land in winter without causing deep ruts, and without over-taxing the horse employed. This cart has also proved an asset in the carrying of kale and soiling crops to be fed to cattle on

PRICES OF ARTIFICIAL MANURES

grass land. There is little information available as to the normal life of pneumatic tyres on farm carts, but since the rate at which these vehicles travel is relatively slow, the wear is negligible, and the makers estimate a life of at least eight years. There has been an extension of this equipment to cover the needs of most vehicles, and on the Midland Agricultural College Farm, pneumatic tyres have been fitted to barrows and pig-swill carriers.

* * * * *

PRICES OF ARTIFICIAL MANURES

Description	Average price per ton during week ended July 12				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 8 16d	£ 8 16d	£ 8 16d	£ 8 16d	s. d. 11 4
„ „ Granulated (N. 16%) ..	8 16d	8 16d	8 16d	8 16d	11 0
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 15d	6 15d	6 15d	6 15d	6 7
Calcium cyanamide (N. 20.6%)	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 10	3 5	3 2	3 7g	4 9
Potash salts (Pot. 30%) ..	5 13	5 10	5 7	5 11g	3 8
„ (Pot. 20%) ..	4 1	3 17	3 14	3 19g	3 11
Muriate of potash (Pot. 50%)	10 9	10 2	9 15	10 5g	4 1
Sulphate „ „ (Pot. 48%)	12 5	12 0	11 15	12 3g	5 1
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%)	3 2	..	3 4	2 16k	3 6
„ (S.P.A. 13½%)	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	6 10	6 5	6 7f	6 7	..
Steamed bone-flour (N. ½%, P.A. 27½-29½%) ..	5 15	5 7	5 2f	5 2	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, and for lots of 10 cwt. and under 1 ton 15s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
Principal, Moulton Farm Institute, Northampton.

Feeding in Relation to Sterility in Cattle.—Stock-breeders throughout the country are much concerned about the loss arising from sterility in cattle, and there can be no doubt that it has become serious. Sterility is most commonly the result of disease in some part of the reproductive organs, but may be due to functional disturbance. It is not proposed here to deal with disease, but as it has been observed by competent veterinary authority that sterility is materially influenced by feeding, and that the increase in sterility in cattle in this, and in other countries, is in no small measure due to improper methods of feeding and management, this aspect of the matter may usefully be discussed.

It has been pointed out that the modern cow is often treated more as a milking machine than as a breeding animal, and it is partly because of this, that difficulty is experienced in getting heavy-milking cows to breed until late in the lactation, while in some instances they may prove permanently barren. It is widely recognized that animals that have been heavily fed, say, for show purposes, and exhibited in high condition, often fail to breed, so that many females that are judged the best, from the point of view of conformation, may be lost for breeding.

The influence of nutrition upon sterility has been closely studied, notably in America, and the latest investigations support the assumption that both under-feeding and over-feeding may be contributory causes. It is therefore of primary importance that attention should be given to the matter of feeding in relation to the prevention of reproductive defects.

From the observations made by Pugh and others, there would appear to be little doubt that absence of sufficient calcium and phosphorus may not uncommonly be the cause of the failure of the reproductive organs to work to full functional capacity. In *The Veterinary Record*, 1924, Pugh expressed the opinion that sterility is more prevalent on clay soils than on chalk or limestone formations where calcium is abundant; and although it is true that this view has not been generally accepted, there would seem to be some reason to believe that certain soils, or the herbage

NOTES ON FEEDING

grown on those soils, may have an effect upon reproductive capacity. It is recognized, however, that the nature of the subsoil and the treatment of land with fertilizers, have a determining influence on the composition of the herbage, tending to mask the effect of particular types of soil. In certain cases, absence of iodine has been apparently quite definitely associated with sterility. Generally, on the question of minerals the information is a little vague, but it would seem prudent to include the ordinary mineral mixture in rations for cows, in order to guard against possible mineral deficiency. The mixture now generally used is (in parts by weight) $1\frac{1}{2}$ -2 ground chalk or limestone, and $\frac{1}{2}$ -1 iodized salt, fed at the rate of 2-3 lb. per cwt. of concentrated food.

Dr. Euler has described what he has called "hunger sterility" and "Weidener disease," so called from the district where it was first observed. In this latter case, cows aborted or gave birth to weakly calves, and frequently failed to breed again. The feeding of cod-liver oil, liming the land, and general improvement of the fertility of the soil, gave beneficial results. It seems that, here, the primary cause of the disease was under feeding of essential elements of the diet. Certain workers concerned with nutrition are coming more to the view that balanced manuring of the soil is perhaps the most effective way of ensuring a supply of the necessary mineral matter to stock, particularly during the grazing season when it is difficult to devise a simple method of feeding minerals to animals that are not receiving concentrated food.

The practice of flushing ewes is well known. The object of flushing is both to bring on the period of heat, and to encourage multiple ovulations. This is accomplished by changing the ewes to a higher plane of nutrition immediately before tupping. Where higher feeding is provided by giving an allowance of concentrated food, flockmasters consider that best results are secured if the food given contains a fairly high proportion of protein. In this connexion a recent experience on the Moulton Institute farm may be of interest. A flock of Dorset Horn ewes had been taking the ram normally well, until they were shorn. For a fortnight after shearing none of the ewes came into season, and as the object is to get early lambs the writer considered it to be worth while to make an attempt to stimulate the ewes with a protein-rich food in order to bring on oestrus. The ewes were grazing on a permanent pasture which, on account of

the drought, was barer than is usual in early June, and it was decided to try the effect of $\frac{1}{4}$ lb. per head per day of soya treacle nuts. Within 4 days the ewes began to come into season and tugging proceeded rapidly, so that by the end of a fortnight when the special feeding was discontinued, practically all the ewes had been served. It is, of course, unwise to dogmatize in regard to this single incident, as it could be argued that the ewes might have come into season in any case without the extra feeding, but the result is significant and a further test will be made when an opportunity occurs.

Tutt has noted* that, in parts of the New Forest, delayed oestrus has been rectified not only in cattle, but also in mares, when the affected animals were turned on to richer and more nutritious pastures.

Although an extra allowance of protein may have a temporary stimulating effect upon oestrus, it seems clear that with cows in milk an excessive amount of protein fed over a long period may have the directly opposite effect. Tutt suggests that the protein in the concentrated ration of cows in milk is best limited to 15 per cent. of the mixture given. Experience confirms the view that very badly balanced rations are dangerous, and that when excessive protein is given it may be difficult to get cows to breed.

Closely allied to the question of the effect of nutrition on sterility in cows is that of the general feeding and management of young dairy heifers. One has noticed at the principal shows, yearling and two-year-old heifers, of certain of the purely dairy breeds, shown in very high condition. Dairy Shorthorn breeders discourage the showing of young heifers of their breed for the reason that to feed heavily in order to secure the sort of show form, which is meanwhile considered necessary, is held to have a seriously harmful effect both upon their breeding and milking capacity. On the other hand, certain specialists in at least two of the dairy breeds are prepared to take the risk of feeding heifers heavily for show purposes; and inquiry has shown that some, at least, of the dairy heifers which, shown in high condition, have figured in the prize list as two-year-olds, at the principal shows, have subsequently milked well.

The performance of a dairy cow or heifer is controlled by certain factors—breeding, feeding, management, etc.—

* *The Veterinary Journal*, June, 1933.

NOTES ON FEEDING

and the question arises whether the capacity to milk, under a similar set of conditions, varies with the breed of heifer. For example, it may be that the methods of feeding and management regarded as unsuitable for a Dairy Shorthorn heifer have not the same harmful effect when practised on a Friesian or an Ayrshire. Skill in management will, of course, play an important part. Much regular exercise during the period of preparation of a show heifer will, no doubt, mitigate the injurious results of heavy feeding; but where ordinary commercial heifers intended for the dairy herd are concerned, the safest course would probably be to feed them reasonably well, but to avoid forcing or extra heavy feeding—keeping them growing steadily, and maintaining hard, fit condition without allowing them to become too fat. This method of management, coupled with putting them to the bull early, preferably at 18 months old rather than at 27 months, is likely to give the most satisfactory results both in avoiding sterility and in ultimately securing good milk yields. Heifers that have calved early may be given time to make up growth after the first lactation, by delaying service after the first calving. Some breeders believe that postponing service during the first lactation may lead to difficulty in getting the heifer in calf a second time, and although this cannot be completely disproved, there is little real evidence to support it. The practice has been successfully carried on in a number of good breeding herds over a period of years.

Feeding Stuffs.—Owing mainly to the drought in early June, grass is much scarcer than usual in many districts. Farmers who had mangolds left over from the winter, have found them a valuable supplement to the short supply of grass. Lucerne has been a useful standby during the period of scarcity, and its value in this respect points to the desirability of growing, if possible, at least a small area of lucerne on all milk-producing farms. As regards concentrated foods, maize and the maize products still continue relatively cheap at 1s. 1d. to 1s. 3d. per unit S.E. Imported pollards at less than £5 per ton, and imported middlings at about £5 15s. stand at 1s. 2d. or 1s. 3d. per unit S.E. Palm-kernel meal and maize gluten feed, both of which can be bought in the neighbourhood of £6 per ton, are the least expensive of foods relatively rich in protein, the unit of S.E. in each coming to about 1s. 4d. On the other hand, cotton

NOTES ON FEEDING

cake at from £5 10s. to £6 per ton is one of the dearest foods, this price per ton representing about 2s. per unit of S.E.

* * * * * *

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent Per cent.</i>	<i>Protein equivalent Per cent.</i>	<i>Per ton £ s.</i>
Barley (imported)	71	6.2	5 8
Maize	78	7.6	4 5
Decorticated ground-nut cake ..	73	41.3	7 15
" cotton cake ..	68	34.7	7 5

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.25 shillings, and per unit protein equivalent, 1.88 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1932, issue of the Ministry's JOURNAL, p. 781.)

FARM VALUES.

CROP	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9.6	5 8
Oats	60	7.6	4 9
Barley	71	6.2	5 0
Potatoes	18	0.8	1 4
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 10
Beans	66	19.7	6 0
Good meadow hay	37	4.6	2 15
Good oat straw	20	0.9	1 7
Good clover hay	38	7.0	3 1
Vetch and oat silage	13	1.6	0 19
Barley straw	23	0.7	1 10
Wheat straw	13	0.1	0 16
Bean straw	23	1.7	1 12

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway W.C.2, price 6d. net.

MISCELLANEOUS NOTES

The Agricultural Index Number

BETWEEN May and June the general index of the prices of agricultural produce fell by 2 points to precisely the pre-war level, while a year ago there was a fall of 4 points to 11 per cent. above pre-war. The main factors in the drop this June were the lower prices for fat stock and potatoes, but these reductions were partially offset by increases in the prices of wheat, barley, eggs and butter.

Monthly index number of prices of Agricultural Produce. (Corresponding months of 1911-13 = 100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	102
June	153	140	131	123	111	100
July	145	141	134	121	106	—
August	144	152	135	121	105	—
September	144	152	142	120	104	—
October	139	142	129	113	100	—
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—Wheat at an average of 6s. 4d. per cwt. was 9d. dearer than in May and the index rose by 9 points to 80, while barley at an average of 7s. per cwt. was 6d. higher, the index also appreciating by 9 points to 94. Oats were 1d. per cwt. dearer at 5s. 9d. with an increase of 1 point in the index figure to 77. In comparison with June, 1932, wheat and barley showed no material change either as regards price or index but oats were nearly 30 per cent. cheaper.

Live Stock.—A further slight fall in the prices of fat cattle occurred during June and the index was 2 points lower at 95 as compared with a figure of 118 at the corresponding period last year. Fat sheep also continued to cheapen, the fall of $\frac{3}{4}$ d. per lb. in the average price being greater than that which occurred in the base period and the index was 6 points lower at 114. Bacon pigs were reduced by 1s. 1d. and pork pigs by 1s. 5d. per score, and these substantial reductions were reflected in the fall in the indices of 10 and 11 points respectively. Dairy cows were 7s. per head dearer during June with a consequent upward movement of 3 points in the index, but other classes of store stock were

MISCELLANEOUS NOTES

cheaper, especially cattle and pigs the indices for which fell by 5 and 6 points respectively to 94 and 106.

Dairy and Poultry Produce.—Milk contract prices for June were substantially the same as those in operation during the previous month and the index at 138 was unaltered. Butter was about $\frac{1}{4}d.$ per lb. dearer during the month under review and the index rose 6 points to 91. Quotations for eggs followed the normal seasonal trend but the average increase of 1s. 5d. per 120 was proportionately much larger than that which took place in the base period and the index was 10 points higher at 102, or the same level as a year ago. Fowls and ducks were cheaper but in the case of ducks the fall in 1911-13 was more pronounced.

Other Commodities.—The average price of old potatoes for June was 12s. per ton lower than in May and the index fell by 17 points to 20 per cent. below the pre-war level, whereas at the corresponding period last year the index for potatoes stood at over double pre-war. Clover and meadow hay were a shade dearer on the month and the combined index at 69 was one point higher. Wool was unchanged in price although the index rose by 1 point.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	June	June	Mar.	Apr.	May	June
Wheat	76	80	69	68	71	80
Barley	91	93	79	82	85	94
Oats	90	107	84	81	76	77
Fat cattle...	123	118	105	100	97	95
„ sheep...	145	107	112	116	120	114
Bacon pigs ...	111	91	110	112	107	97
Pork „	120	91	118	116	107	96
Dairy cows ...	123	116	109	106	101	104
Store cattle ...	128	115	103	99	99	94
„ sheep	145	98	85	84	84	83
„ pigs	141	85	122	123	112	96
Eggs	102	102	101	93	92	102
Poultry	152	132	129	124	132	132
Milk	148	137	129	153	138	138
Butter	107	96	93	91	85	91
Cheese	125	153	110	111	115	121
Potatoes	200	213	106	87	97	80
Hay	89	69	66	66	68	69
Wool	68	57	62	62	62	63

MISCELLANEOUS NOTES

Annual Canners' Convention, 1933

THE Annual Canners' Convention, organized by the National Food Canning Council, will be held this year at Bristol, from Tuesday evening, October 31, to Friday morning, November 4, during which time the Imperial Fruit Show and Canners' Exhibition will be in progress at the Coliseum, Bristol. A number of conferences will be held, as usual, on subjects of importance to the canning industry. Special arrangements are also being made, with the active support of the Bristol and District Grocers' Association, to secure the interest of retailers in the Bristol area in British canned fruits and vegetables.

Applications for further particulars of the Convention should be addressed to the Secretary, National Food Canning Council, 12, Whitehall, London, S.W.1.

Breed Improvement in Rabbits

THE following note has been communicated by Mr. W. King Wilson, the Rabbit Specialist at the National Institute of Poultry Husbandry, Newport, Salop:—

Rabbit-breeding is of considerable economic importance, not only because it contributes to the food supply, but on account of the very extensive use made of rabbit pelts in the fur trade. This country imports annually some 50,000,000 rabbit skins for treatment and home consumption or re-export. Large numbers of pelts are also produced here; and among the varieties of tame rabbits are many with skins of appreciable value for fur purposes. The returns of one fur auction firm recorded the recent sale of 163,000 raw skins of four specified breeds, Chinchilla, Havana, Beveren and Angora; the majority of these skins are, perhaps, disposed of by private sale rather than by public auction.

The Chinchilla was imported from the Continent in 1919, the Beveren during the War, and the Havana at various times, whilst the Angora has long been bred in these islands, but for "wool" production rather than for skins, although a certain number of Angora pelts find their way to the fur market. During the past dozen years, fur-rabbit breeding has been notable for the production of other and new varieties, several of which, such as the "Siamese," "Marten Sable," "Silver Fox," "Nutria" and other coloured Rex types, are of considerable economic value. Some of these new types occurred as mutations, but others

MISCELLANEOUS NOTES

have been evolved intentionally by applying Mendelian principles to practical rabbit breeding.

Through careful selective breeding, and the stimulus of strong competition at shows, a phenomenally rapid improvement has been achieved in these new and potentially useful fur breeds. Some idea of the progress made may be realized from the evidence of the show figures. Thus, in 1931, there were over 65,500 entries of live rabbits at 334 leading shows, excluding the purely local exhibitions. At the 1933 Bradford show there were 2,938 entries,* including 96 Angoras, 119 Havanas, 197 Sables, 144 Beverens, 215 Chinchillas and 263 Rex. Keen competition at shows of this size is, undoubtedly, one of the most effective stimuli for the improvement of breeds and the quality of their furs.

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on Monday, June 26, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Hertfordshire.—An Order fixing special overtime rates of wages for male and female workers employed during the period of the corn harvest of 1933. The overtime rate for male workers of 21 years of age and over is 11*d.* per hour for employment after 5.30 p.m. and in excess of 48 hours per week. For female workers of 19 years of age and over the rate is 8½*d.* per hour.

Norfolk.—An Order fixing minimum and overtime rates of wages for male and female workers to come into force on July 2, 1933 (i.e., the day following that on which the existing rates were due to expire) and to continue in operation until December 30, 1933. The minimum rates for male workers of 21 years and over are 30*s.* per week of 50 hours in any week in summer (instead of 53 hours as at present), 40 hours in the week in which Christmas Day falls and 48 hours in any other week in winter, with, in addition, in the case of workers employed as teamsmen, cowmen, shepherds or yardmen 5*s.* 6*d.* per week, and in the case of sheep-tenders and bullock-tenders 4*s.* 6*d.* per week, in lieu of overtime in respect of work in connexion with animals other than such work on Christmas Day, in respect of which an additional sum of 5*s.* is payable in each case, except where a day's holiday on full pay is given in the week in which Christmas Day falls or in the following week. The overtime rates for male workers of 21 years of age and over are 9*d.* per hour on weekdays and 11*d.* per hour on Sundays. The minimum rate for female workers of 18 years of age and over is 5*d.* per hour with overtime at 6½*d.* per hour on weekdays and 7½*d.* per hour on Sundays.

Anglesey and Caernarvon.—An Order fixing a special minimum rate of wages for male workers of 18 years of age and over engaged specially for work in connection with the hay and corn harvests of 1933. The rate is 7*s.* per day.

A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on Monday, July 24, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

* Compared with 1,714 rabbit entries in 1923.

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The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Cambridgeshire and Isle of Ely.—An Order fixing special minimum rates of wages for male and female workers employed on harvest work during the period of the corn harvest of 1933. The rate for male workers of 21 years of age and over is a sum of £11 to cover a period of four weeks of 64 hours per week (excluding Sundays), and in addition 11*d.* per hour for any employment on Sundays and in excess of 64 hours per week. For female workers of 18 years of age and over the rate is 8*d.* per hour for all time spent on the corn harvest.

Essex.—(1) An Order cancelling, as from August 19, 1933, the existing minimum and overtime rates of wages for male workers and minimum rates of wages for female workers, and fixing fresh rates in substitution thereof to come into operation on August 20, 1933, and to continue in force until March 24, 1934. The minimum rates for male workers of 21 years of age and over are 30*s.* per week of 52 hours in any week in summer (which is deemed to be the period commencing on the last Monday in February and terminating on the last Saturday in October, instead of commencing on the second Monday in February and terminating on the second Sunday in November, as at present), 39½ hours in the week in which Christmas Day falls and 48 hours in any other week in winter, with overtime throughout the period unchanged at 9*d.* per hour on weekdays, and 10*d.* per hour on Sundays and Christmas Day. For female workers of 21 years of age and over the minimum rate remains unchanged at 5½*d.* per hour for all time worked.

(2) An Order fixing special minimum hourly rates of wages applicable to male and female workers for all employment on corn harvest work during 1933 in lieu of the general minimum and overtime rates otherwise applicable. The minimum rate for male workers of 21 years of age and over is 9*d.* per hour and for female workers of the same age 7*d.* per hour.

Norfolk.—An Order fixing special minimum and overtime rates of wages for male workers employed on the corn harvest of 1933. The minimum rate for male workers of 21 years of age and over employed for the whole harvest period is £11 to cover all time spent on the harvest. In the case of male workers who are not employed for the full period, special differential rates are proposed for all overtime employment on the corn harvest, the rate for male workers of 21 years of age and over being 9½*d.* per hour.

Oxfordshire.—(1) An Order fixing minimum and overtime rates of wages for male and female workers to come into force on July 30, 1933 (i.e., the day following that on which the existing rates were due to expire) and to continue in operation until October 28, 1933. The minimum rates for male workers of 21 years of age and over are 28*s.* per week of 41 hours in the week in which August Bank Holiday falls and 50 hours in any other week with overtime at 8*d.* per hour on weekdays and 10*d.* per hour on Sundays and August Bank Holiday.

(2) An Order fixing special differential rates of wages for overtime employment for male and female workers employed on harvest work during the corn harvest of 1933. The special overtime rate for male workers of 21 years of age and over is 1*s.* per hour and for female workers of 18 years of age and over 11½*d.* per hour.

Suffolk.—An Order fixing special minimum rates of wages for male workers during the corn harvest of 1933. The rate for male workers of 21 years of age and over employed on harvest work throughout the harvest period on farms of at least 60 acres of

MISCELLANEOUS NOTES

corn is not less than the ordinary minimum rate otherwise applicable, with, in addition, a bonus of £5 payable on the completion of the harvest period; the hours of work in respect of which this rate is payable are 11½ on any weekday while harvest work is in progress. For workers of 21 years of age and over who do not work on harvest work throughout the harvest period or who are employed on farms of less than 60 acres of corn, the rate is 10d. per hour for all employment on harvest work.

Enforcement of Minimum Rates of Wages.—During the month ending July 14, legal proceedings were taken against two employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed			Costs allowed			Arrears of wages ordered			No. of workers involved
Sussex ...	Chichester	£	s.	d.	£	s.	d.	£	s.	d.	
		4	0	0	—			(a)			3
Yorks, W.R.	Leeds ...	4	0	0	5	5	0	53	15	1	2
		£8	0	0	5	5	0	53	15	1	5

(a) Two of the workers stated that the arrears had been paid to them prior to the hearing and the case of the other worker was dismissed.

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Devon.—Miss V. C. Milner, N.D.P., has been appointed Instructor at the Travelling Poultry School, *vice* Miss I. M. Unkles, N.D.D., C.D.P.

Essex.—Mr. W. J. Lintin, N.D.P. (Hons.), has been appointed Manager of the Poultry Instructional Station, *vice* Mr. E. E. Wansbury.

Miss E. G. Aust, B.Sc. (Hort.), has been appointed temporary Student-Assistant in Horticulture, *vice* Miss N. B. McCabe.

WALES

Caernarvon.—Mr. Evan Davies, M.Sc., N.D.A., has been appointed Assistant Agricultural Organizer and Lecturer in Agriculture, *vice* Mr. Edwin Jones, resigned.

Teaching Staffs at University Departments of Agriculture, Agricultural Colleges, etc., in England and Wales

The Midland Agricultural College, Sutton Bonington

Miss Alice M. McMillan, N.D.D., C.D.P., has been appointed First Assistant Instructor in Poultry-keeping, *vice* Miss V. C. Milner.

Miss Joyce E. Jeffery, N.D.D., has been appointed Second Assistant in the Dairy, *vice* Miss K. Cragg.

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Root Nodule Bacteria and Leguminous Plants. By E. B. Fred, I. L. Baldwin and E. McCoy. Pp. xxii + 343; 47 plates and 4 full-page diagrams. (Madison, Wis., U.S.A.: University of Wisconsin. Studies in Science, No. 5. 1932. Price \$3.)

This is almost certainly the most comprehensive work on nodule bacteria and their relations with leguminous plants that has appeared

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in any language. There is little that it omits, and the searcher after information within its scope will find summaries of practically every aspect of our knowledge of the subject. The authors have themselves contributed materially to an understanding of the "vital and perplexing field" of the complex relationships between nodule bacteria and soil fertility. If a complaint of lack of proportion can be made, it might be said that the authors—particularly the junior author—have erred on the side of modesty in refraining from giving as extensive a review of their own work as they have given of the work of others. Not only is the bibliography good, but the discussion in the text is ample. The bibliography contains over a thousand entries, but the index is rather poor.

The first chapter is devoted to the history of leguminosae in agriculture, and, like the other chapters, is headed by an apt quotation. The quotation for Chapter I is from Burke: "The march of the human mind is slow." Other chapters give in detail methods for the isolation and study of root nodule bacteria.

The book is not entirely a laboratory text-book, however, since every phase of nodule formation and of the factors affecting it receive attention. The question of "inoculation" receives much space, as some of the sub-headings show: "What constitutes a satisfactory culture?"—"When to inoculate and what to expect from inoculation."—"Directions for the use of artificial cultures." Under the last-mentioned heading both American and British practice are given. These are the points which will particularly interest the farmer and his advisers in this country, where the history of seed "inoculation" lies largely in the future. In the United States, with its diverse crops, the story of the attempts to utilize artificial cultures is already a long one, as this book shows.

In a work such as this, a feature of interest is what is left out as unknown. Those who are labouring to fill the gaps in our knowledge regarding the practical application of leguminous crops have good reason to be grateful to the authors for the trouble and perspicuity which they have employed in compiling so valuable a source of reference and information.

Agricultural Progress. Volume X. 1933. 252 pp. (Cambridge: W. Heffer & Sons, Ltd. Price 5s.)

This annual volume, the organ of the Agricultural Education Association, contains, *inter alia*, papers read at meetings of the Association, information regarding recent activities in various branches of agriculture, book reviews, notes and personalia. The present issue opens with a symposium on "Recent Advances in Agricultural Economics," including an introduction by Mr. C. S. Orwin, and studies by a number of well-known agricultural economists. In addition there are sections on education, poultry, animal husbandry, dairying, chemistry, etc., with a supplement on "Methods of Pasture Analysis" by a number of workers. The last is the result of some years' experience and is thus of real value, while the general contents of the work cannot fail to be of interest to those who wish to keep abreast of the latest developments in various branches of farming practice.

Rabbits 1933: The Year Book of the National Rabbit Council. Pp. v + 88. Illus. (Obtainable from Dr. J. N. Pickard, Institute of Animal Genetics, Edinburgh. Price 1s. 6d.)

The past year has been one of considerable difficulty for most societies, but the report of the National Rabbit Council shows an increased independent membership, while three new local organizations have affiliated. Despite adverse conditions, the industry has been well maintained, and in some branches has made good progress. There has been a strong demand for the lower grades of Angora wool, and the value of home-produced pelts of high quality is becoming more

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widely recognized. An article on "Shows" notes that the three important shows of the year were very successful, the entries at Bradford reaching the record number of 5,000. The Year Book also contains articles reviewing the present position of the industry and dealing with various breeds, a register of breeders, a stud buck register, and other items likely to prove useful to persons interested in rabbits.

Agronomy (*Ackerbaulehre*). By T. Roemer and F. Scheffer. Pp. viii + 451. Illus. (Berlin, S.W.11: Paul Parey, Hedemanstrasse 28 and 29. 1933. Price RM.19.80.)

The introduction to this exhaustive work points the obvious by stating that the natural foundations of arable cultivation are threefold: the weather, the soil and the plant, whilst these have been complicated by the introduction of an arbitrary human factor, cost of production and price. As a consequence the book treats of these factors in this order. It analyses the unalterable factor of the weather in its various phases, and describes the growth and condition of the different types of soil, this section being completed by a description of the relations between the climate, the soil and the plant.

Thence the work passes naturally on to the systems of crop rotation, the methods of manuring, and the types of cultivation that have been adopted in order to modify the influence of the soil upon the resulting harvest. The selection of seed for the purpose of securing the best type of product and the largest harvest is treated in a section by itself, while the important question of weeds and weed control is also deservedly treated in its own place. The final words are devoted, as they should be, to the harvest.

This book is another example of the fact that all over the world people are being moved in the same directions. Whilst Germany has, it states, rendered itself self-supporting in the matter of cereal supplies, it is still necessary for the country to import other vegetable food stuffs. The aim of cultivators should be to ensure that German households should be able to obtain their whole nutriment from home sources. Not only should the farmers aim at this definite object but they should endeavour to produce a quality product, which can be graded and the known merits of which alone would ensure that the people would purchase it in preference to an imported article. The book sets out to teach not only the methods by which this end can be achieved but also to supply the scientific reasons for these methods.

It is unlikely that many British farmers or agricultural students will struggle through such a large text-book as this in a foreign language, but the volume might profitably be consulted by those who are interested in the more general aspects of agricultural education, and especially by those who are responsible for the curricula of the agricultural departments of our Universities and Colleges. The work of the Institute for Crop Production in the University of Halle is well known in this country, and many have used Professor Roemer's standard monograph on sugar-beet culture or followed his work in developing Experiment Rings in Germany. They will be interested to see what type of material he presents in a general course on crop production and to note that the treatment of soil and plant nutrition questions is distinctly more technical than that in most British or American text-books of similar scope. Those who are more interested in the material than in the method of treatment will regret the complete absence of references to the original literature.

Woodwork on the "Farm" (*Travaux en Bois à la Ferme.*) By R. Champly. Pp. 206. 78 Figs. (Paris, VIe.: Librairie Agricole de la Maison Rustique, 26, Rue Jacob. 1932. Price 12 francs.)

This little book gives an admirable indication of the thrifty habit of the French peasant class in its constant desire that nothing shall be wasted. Ranging from simple directions (in Chapter II) for

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splicing broken or rotten posts and frames, to (in Chapter XXXIX) designs for chairs and tables made from old barrel staves, it comprises, in between, devices for performing simply many operations relating to timber structures, including such subjects as strengthening a deflected beam by wire-trussing, plank-bending, the design of simple roof trusses, steps and stairs, bridges, fencing and domestic furniture. There are directions for building a boat and various prescriptions for waterproofing fabrics such as rick covers and wagon-tilts. Chapter X, which gives suggestions for flooring various spaces having their least dimensions in excess of the lengths of timber available, is ingenious and amusing, recalling a type of competition puzzle sometimes seen in popular magazines. In general, this book is better suited to the man whose hobby it is to make things than to one who is seriously confronted with the need for substantial improvements.

Fertilizers and Crop Production. By L. L. van Slyke, Ph.D. Pp. xiv + 493. 63 Tables and 70 Figs. (New York: Orange Judd Publishing Co., 15, East 26th Street. 1932. Price \$4.)

The work of the late Dr. Slyke as chemist of the New York Agricultural Experiment Station made him particularly well known in the United States, and he acquired an international reputation through his "Fertilizers and Crops," published in 1912. It would be impossible in a brief notice to provide a critical review of a work so exhaustive in character as this. The author regards it as essential, not only to give dogmatic instruction for the use of the farmer, but to describe the relation of the fundamental factors that go to the stimulation of plant life. In pursuance of this ideal, the book is little less than encyclopædic in character, and treats comprehensively the conditions under which plant foods, whether in the form of soil compounds, of farm-produced materials, or of commercial fertilizers, can be conserved and at the same time used with the greatest efficiency and economy in the production of crops. This quality will render the book of more service to people engaged upon agricultural education and in giving advice to farmers than to the practical farmer who will probably be satisfied to regard it, like other works on the same scale, as a book of reference. The student of agriculture would, however, be well advised to consult it, bearing in mind that New England is not unsuitable for comparison with the conditions of this country, although there are environmental differences in climate and soil conditions, as well as in the incidence of crops, that make it necessary to adapt the conclusions arising from experience there before applying them in whole to this country.

Pruning in Summer. By an Amateur. Pp. 27. (London: E. J. Burrow & Co., Ltd. 1933. Price 2s.)

Amateurs have been puzzled as to the system of pruning most suitable for trained trees in private gardens. Writing from a personal experience of over twenty years, the author gives a clear description, within a small space, of his unorthodox method of fruit-tree pruning. The system that he advocates is based on that of Lorette. No pruning is done in winter, but the leaders are pruned early in May and the laterals from June to September. The writer has found this method particularly useful for growing high-grade fruit on cordon trees, a method that might be much more widely adopted in small private gardens, for which it is so eminently suited.

Poultry Breeding. By Morley A. Jull. Pp. xiv + 376, and 71 Figs. (London: Chapman & Hall, Ltd. New York: John Wiley & Sons, Inc. 1932. Price 23s.)

This comprehensive study, by the Senior Poultry Husbandman in the United States Department of Agriculture, deals with all aspects of breeding, and contains much that will be of interest to the practical breeder. Heredity, Mendelism, sex-linkage, egg-laying characters and

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other important matters are fully discussed, references being given in each instance indicating the particular research work that has been carried on in various parts of the world. The latter half of the book deals with such questions as effects of inbreeding, egg weights, early maturity and the selection of breeding stock so as to ensure good hatchability and healthy fecund progeny. The concluding chapters give an interesting summary of the methods that have been adopted in America, Canada and this country to build up healthy strains of poultry. The author makes it clear that successful breeding is a highly skilled business, and shows to what an extent the poultry industry is indebted to science and research.

An Introduction to Tropical Soils. By Dr. P. Vageler. Trans. by Dr. H. Greene. Pp. xvi + 240, and 25 Illus. (London: Macmillan & Co., Ltd., 1933. Price 15s.)

This work, which its author modestly describes as an "introductory account of tropical and subtropical soils," embodies the results of twenty years' pedological research in Africa and Asia, where the subject has been investigated from both theoretical and practical standpoints. Its primary purpose is to assist the planter, remote from research stations, to solve his own problems. The book should also be useful to students of tropical agriculture, who will find therein the formation and properties of tropical soils treated in greater detail than in ordinary manuals of pedology. Sir John Russell contributes an appreciative Foreword, and there are some practical appendices, including a brief bibliography prepared at the Imperial Bureau of Soil Science.

The New Agriculture. By O. M. Kile. Pp. x + 218. (London: Macmillan & Co., Ltd. 1932. Price 10s.)

This short work by an agricultural economist describes the social and economic conditions of the agriculture of the United States up to as recent a date as May, 1932. The picture is not less sombre than that of other regions, but, after eleven years' experience of decline in the industry, America, like ourselves, is taking its farm problem seriously. From this starting point Mr. Kile projects his mind forward to an agriculture offering rewards equal to those derivable from manufacture, and maintaining and even adding to the present standard of social life. In his quest he turns aside from artificial governmental remedies and seeks a safer basis of agricultural prosperity—salvation from within. The author recognizes the impossibility of restricting production, even with the protection of high tariff walls, and states the following basic principle on which to build the new agriculture: "The only logical course is to strike out boldly for the most efficient possible production—the utilization of every device of organization, financing and operation that industry has found valuable in reducing production costs to the lowest practicable basis—then after the smoke of internal competition has cleared away, if there still remains a surplus, develop the markets of the world to absorb it."

The biggest contribution in bringing down costs would be found in scaling-up the business farms to two, three, four times their present size, making them units of 500 to 1,000 acres, mechanizing them, and financing them as joint stock companies in the accepted industrial way. Other cost-reducing systems of handling land have emerged from the experimental stage in the United States. The Walker Gordon controlled co-operative plan, which seems to have impressed visitors from this country more as a spectacle than as a solution of farming on factory lines, is here fully described. An account of the Kansas Wheat Farming Company shows mechanization applied to one product to a degree that must come near finality. The Collins Farm Company illustrates a corporate form of financing and managing 150 average size farms scattered over 31 counties of Northern Iowa.

The book is well worth reading, and adds to our knowledge of

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mechanized systems. The author approaches the problem in the stimulating thought that agriculture can help itself, and he is never transported beyond solid earth. Comparisons with our case are inevitable.

The style is plain and straightforward, owing nothing to high lights or fine writing. Only very seldom does the transatlantic idiom obtrude, but here and there we are pulled up sharply where the proof-reader nodded.

Report of the First Italian National Congress on Farm Machinery
(*Atti del 1° Congresso Nazionale di Meccanica Agraria.*) Pp. 713.
Illustrated. (Rome: Stab. Tipo-Rotocalcografico "Arte Della Stampa." 1932.)

Most European countries are confronted with similar problems in adapting their farming methods along the lines of what has come to be known as mechanization. European conditions, however, vary from those of the American and Antipodean countries where mechanization has been most fully carried out. In Italy where a large proportion of the land is occupied in small parcels, and crops such as rice, olives and the vine are common, the problem of mechanization presents special features.

It is, of course, in the realm of cereal cultivation that mechanization has been most usually applied, and in this direction the problems involved in the substitution of power haulage for animal traction have a family resemblance in all countries. It is with no surprise, therefore, that we find a good deal of the time of the Congress taken up with considerations bearing upon this subject, and it is natural that the work done or in progress should have similar features with that being undertaken at present by our own agricultural engineering research station at Oxford. In addition to the work of the tractor in hauling ploughs and other implements of cultivation, one of its most universal uses is in connexion with drainage, and two careful essays are published in this volume, one dealing with the increasingly popular method of mole drainage, and the other with special machines available in Italy for cutting open drains. Among the problems peculiar to some arid countries is the relative value of the disc plough as compared with the mould-board plough. This problem is not, of course, so urgent in this country, but the experiences described by Professor Dominici in this volume will afford some indication of the limitations that the use of the disc plough may have in certain conditions.

In Italy rural electrification, owing to the possibility of developing supplies from natural hydraulic power, is more widespread than in this country and a whole session of the Conference was given to this subject, one paper being devoted to electric cultivation and another to the adoption of electric power in the milk industry. Readers of this review will remember the recent considered essay on the subject of land reclamation in Italy by Sir Daniel Hall, and indications of the work in progress supplied by that article can be amplified by consultation of the two papers included in Session 2 dealing with the problems of irrigation, and the electrification of the reclaimed areas.

Session 3 was devoted to consideration of mechanization for special crops, and the agricultural industries peculiar to Italy. The papers dealing with mechanical harvesting of cereals in relation to the development and growth of insects and pests, and with agricultural machinery used in cultivation in Sicily are of interest. It is to be observed that in the essay dealing with the mechanization of sugar beet culture, some emphasis is placed upon the possibility of using transplanting machinery in the cultivation of this crop.

It is, of course, not possible to deal fully and in detail here with each of the contributions to this volume, but perhaps sufficient has been said to indicate that the work being done in Italy towards the

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mechanization of that country's agriculture is on a scale commensurate with the measures that are being taken to enhance its agricultural output, and that the work should be watched with care and attention by agricultural engineers and research workers in farm engineering in other parts of the world.

Hunger Fighters. By Paul de Kruif. Life and Letters Series, No. 45. Pp. 348. (London: Jonathan Cape. Price 4s. 6d.)

It would seem that the primary duty of all agriculturists is to appease, if not to fight, the hunger of themselves and others. During the last half-century, however, the desire to increase production for the benefit of the world's food supply has brought in its train innumerable problems, particularly those of disease and climatic conditions. These have too often meant depression and ruin to the farmer, and it is the hunger so created amongst American farmers and its allaying, that this book describes. It is a series of biographical accounts of men of science who have been the means of finding solutions to the American farmers' problems.

The problems dealt with range from the provision of new varieties of wheat and maize to the discovery of vitamins. It is written in a racy manner, and the reader never loses interest but, to a scientific mind, the glib phrases and colloquial expressions seem scarcely dignified in dealing with such important subjects.

There is no doubt that some permanent record should be kept of these men and their work, for this is the very essence of the history and development of agriculture throughout the world. Whether romantic biography—for that seems its only classification—is the best means of doing this is open to question, and one is almost tempted to ask whether this book accords "deference due to men of pedigree."

The lives of scientists may be dull biography if written in the accepted manner, and there is something to be said for a different treatment such as that of Paul de Kruif. It must not, however, be written so as to make it difficult to appreciate the scientists' capacity for originality, which is their claim to greatness, by over-emphasizing personal anecdotes and peculiarities.

Elements of Agriculture. By W. Fream, LL.D. Twelfth ed. Edited by Sir Rowland Biffen, F.R.S. Pp. viii + 720. Plates xv + 132 Figs. (London: John Murray. 1932. Price 10s. 6d.)

It is 41 years since Fream prepared, on behalf of the Royal Agricultural Society of England, "an elementary work on Agriculture adapted for use in rural and other schools and classes"; the eighth edition (1911) was revised under the editorship of J. R. Ainsworth-Davis; the present (twelfth) is the product of the staff of the Cambridge School of Agriculture, finally edited by Professor Sir Rowland Biffen, who took over this task on the death of Professor T. B. Wood. Sir Rowland's collaborators are Messrs. A. Amos, D. Boyes, H. R. Davidson, F. L. Engledow, F. H. Garner, R. E. Glover, E. T. Halnan, J. Hammond, H. Hunter, W. S. Mansfield, F. H. A. Marshall, H. H. Nicholson, F. Procter, H. G. Sanders, C. Warburton, A. E. Watkins, and H. E. Woodman.

In the gap of over two decades since the last revision, the old knowledge has been tested and there are great contributions of new. The book, therefore, has been to all intents re-written, and re-written for a wider public—ranging from farmers to students at agricultural colleges. Great weight has been placed on showing the bearing, in the case of the more scientific sections, on agricultural practice, on cross referencing, and indicating publications where the subjects are more fully treated.

With such books as these, for which we have waited long, the present generation is far better served than the old, and it may confidently be predicted that this edition of Fream will be freely recommended by teachers of agricultural science. It does not detract

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from that statement to hope that revision will be continuous and new editions reasonably frequent. We make the suggestion that the Cambridge School of Agriculture should invite correspondence as a means of correcting and modernizing the text. In particular, the section on potatoes would seem to need the immediate issue of a corrigenda slip.

The British Goat Society's Year Book for 1933. Pp. 179 and 61 Illustrations. (Compiled and issued by the Secretary, H. E. Jeffery, Roydon Road, Diss, Norfolk. Price 1s. 6d.)

The thirteenth issue of this annual publication is full of useful information for those who are interested in goats. This year feeding and management have been selected as subjects for special consideration, but other aspects of goat-keeping also receive attention. Thus Mrs. Roger Wethered offers a practical "Suggestion for Selling Goats' Milk"; Miss D. C. M. Gibbon deals with "The Financial Aspect of Goat Keeping"; and Dr. S. A. Asdell contributes an interesting account of "Goat Research during the Past Year." The progress of the Stud Goat Scheme, now in its ninth year, is reviewed by Mr. J. L. Whytehead, who concludes that "this scheme, which is administered by the Society with great care and economy, gives a good return for the money expended," and has had a beneficial effect on the quality of the goats kept throughout the country.

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- Beet-Sugar Factories Committee of Great Britain*.—Sugar-Beet, 1933, by G. F. N. Battle and W. Swannack. (63 pp.) London, 1933. [63.3433 (42).]
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THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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NOTES FOR THE MONTH

Use of Home-grown Food : Pioneer Course in Cumberland

CUMBERLAND and Westmorland have rendered special service to agricultural education in the past by providing a pioneer Farm Institute at Newton Rigg. That progressive spirit has been demonstrated anew by the special rural course for teachers of domestic subjects in the two counties, held there from July 17 to 27 last. The course was attended by thirty teachers, most of whom resided at the Institute and were thus in daily touch with farm work.

The programme included an introduction to the making of butter, cheese and ice-cream, and addresses on the care of milk, its composition and food value and the future organization of supplies. Talks and demonstrations on salad and herb culture, fruit and vegetable preservation, the production of honey, egg preservation and testing, bacon curing, killing and trussing of poultry, and treatment of rabbit skins were also arranged. Cookery classes relating to the use of these farmhouse products were held at the Domestic Subjects Centre in Penrith. National Mark schemes were discussed.

All concerned made their contribution to the modest expenses of the course. The students paid their own fees (15s. for resident and 10s. for non-resident students, the latter receiving midday dinner and tea). The Education Committee allowed the teachers the necessary time off, and the services of the Farm Institute staff were freely available. The Board of Education and the Ministry of Agriculture took a sympathetic interest in the course.

Those who attended the course went back to their work in a missionary spirit and will spread a fresh interest in the thrifty use of the wholesome home-grown foodstuffs

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produced in the two counties. Other counties might well consider the promoting of similar schemes as a useful means, involving no special financial outlay, of furthering agricultural and domestic needs.

The Woollen Industry

THE current issue of "Wool Intelligence Notes,"* published by the Empire Marketing Board, records continued improvement in the wool situation, which is attributed in large measure to the stimulus of rising commodity prices, increased industrial activity, and fears of short supplies of the raw material. Competition has been very active at the London Colonial Wool Sales, and at the close of the July series merinos and fine crossbreds were about 20 per cent. and medium crossbreds about 15 per cent. above the May level. Carpet wool has also advanced, with consequent improvement in employment in the trades concerned. Exports of tops and yarn from the United Kingdom during the first half of the year exceeded those of the corresponding period of 1932. Other features in this month's issue of the Notes are a review of the United States wool market, particulars of present wool stocks in this country, and a statistical appendix showing the production of wool in all producing countries, and their export trade during the past nine years.

Snapdragon Rust: a New Disease in England

ALTHOUGH the cultivated Snapdragon (*Antirrhinum*) is a European plant, yet on that continent (including the British Isles) its Rust has not hitherto been seen. In the United States of America, however, to which the Snapdragon was introduced from Europe a long time ago, the Rust fungus, *Puccinia Antirrhini*, has for many years been exceedingly troublesome, especially under glass. The Rust also occurs in Canada and in Bermuda, but has not yet been found in other countries.

Unfortunately, during the last few weeks, this Rust has quite unexpectedly made its appearance in the south of England, and reports of it, with specimens in most cases, from about twenty different places in the counties of Hants,

* Vol. I, No. 4, obtainable gratis on application to the Wool Statistics Advisory Committee, Empire Marketing Board, 2, Queen Anne's Gate Buildings, Westminster, S.W.1.

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Sussex, Surrey, Kent and Essex have already been received at the Ministry's Plant Pathological Laboratory.

The source or sources of the outbreaks are unknown; but the disease is stated by American plant pathologists not to be seed-borne. Its development has probably been favoured by the very hot weather recently experienced. The Rust is easily recognized by its dark brown or snuff-coloured pustules on the foliage and stems, and severely affected plants soon become withered up and practically dead. The immediate and thorough destruction by burning of all affected plants (including even apparently healthy ones in proximity to them) is imperative if the Rust is to be stamped out and prevented from obtaining a permanent foothold here. The surface of the soil may be sprayed with a 1 per cent. solution of bluestone (copper sulphate). In a garden in which an outbreak has occurred no *Antirrhinums* of any kind should be allowed to overwinter, otherwise there is a danger of the Rust recurring there next summer.

Diseases of Animals Acts : Report of Proceedings for 1932

THE Report* of Proceedings under the Diseases of Animals Acts for the year 1932, recently issued, records two events of special importance that occurred during the year, viz.:—the institution by H.M. Government of an inquiry into the diseases of cattle and the best means of combating them; and the Agreements made at the Ottawa Conference to facilitate the importation of Canadian cattle into the United Kingdom, and the importation into Canada of pedigree stock from the United Kingdom.

Part I of the Report describes the present position of the country with regard to animal diseases, and states that Great Britain continued to be free from cattle plague (rinderpest), contagious pleuro-pneumonia, sheep-pox, rabies, epizootic lymphangitis and glanders. The number of outbreaks of foot-and-mouth disease was twenty-five, the lowest recorded in any year since 1918, with the exception of the year 1930 when only eight outbreaks occurred.

There was a satisfactory decrease of 23 per cent. in the number of outbreaks of swine fever as compared with the year 1931; also a decrease of 26 per cent. in the number

* Report of Proceedings under the Diseases of Animals Acts for the year 1932. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price 1s. 3d., post free, 1s. 5d.

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of outbreaks of anthrax, and a decrease of 8 per cent. in the number of outbreaks of parasitic mange of equine animals. On the other hand, there was an increase of 4 per cent. in the number of outbreaks of sheep scab.

The usual details showing the results of the administration of the Tuberculosis Order of 1925 by Local Authorities during the year 1932 are given, with comparative statements for the preceding six years during which the Order has been in operation. The number of cattle examined by veterinary inspectors, under the provisions of the Order, rose from 288,968 in 1931 to 302,354 in 1932, and the number slaughtered increased by 424 to the record figure of 19,027.

Part II deals with the measures taken to prevent the introduction and spread of disease in this country, and includes a reference to the Imported Animals Order of 1932 and the Importation of Meat, etc. (Wrapping Materials) Order of 1932. The first Order gave effect to various amendments shown by experience to be desirable in order to overcome difficulties observed in the enforcement of the existing regulations. The second Order prohibits the use of meat wrappers for the making of bags in which foodstuffs for animals, fertilizers and horticultural produce are packed and distributed. Particulars are given of the animals imported from Ireland and other countries and of instances of disease found in imported animals. These instances were limited to six cases of tuberculosis in cattle and 71 cases of sheep scab in sheep imported from Ireland.

Part III describes the administration of the measures for the protection of animals from unnecessary suffering during transit by land and sea. The records show that the casualties in all classes of the traffic in animals have been reduced to a minimum.

Part IV deals with the certification by the Ministry of animals and animal products for export so as to comply with the regulations of the importing countries, and also describes the working of the London Quarantine Station for exported pedigree stock.

Part V briefly describes the meeting in Paris in May, 1932, of the Committee of the International Veterinary Bureau.

Part VI reviews the work of the Ministry's Veterinary Laboratory and Research Institute at Weybridge, including an indication of the lines of research pursued, the work

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done in connexion with the diagnosis of certain scheduled diseases, the preparation and issue of vaccines for animals and poultry, and the conducting of agglutination tests of poultry.

The Appendices to the Report contain the usual statistical tables of scheduled animal diseases confirmed in Great Britain, the live-stock population, animals imported and exported, numbers and breeds of stock exported with the Ministry's certificates, and the incidence of animal diseases in European countries.

Colorado Beetle at Tilbury

IN consequence of the discovery, on August 23, of a small infestation of Colorado Beetle on an allotment near Tilbury Docks, Essex, an Order has been made, under the Destructive Insects and Pests Acts, 1877 to 1927 (The Colorado Beetle Order of 1933), enabling the Minister to take steps to prevent the spread of the pest.

The Order provides that the occupier of any land on which the Beetle exists, or is suspected to exist, shall at once notify the Ministry. It authorises an Inspector of the Ministry, who will, on demand, produce his official authority, to enter upon and examine any crop upon any land on or in the vicinity of which he has reason to believe that the Colorado Beetle exists. The Order further empowers an Inspector or other authorised person to enter any place which has been declared to be an Infected Place under the Order, and to take such steps as he may think expedient for preventing the spread of the Beetle. Similar powers are given in respect of any land to which, in the opinion of an Inspector, the Colorado Beetle is likely to spread from an Infected Place. Occupiers of land are required to render all reasonable assistance and facilities to the Inspector in the discharge of his duties.

On account of the destructive nature of this foreign potato pest, the Ministry asks all growers of potatoes throughout the country to examine their crops so long as the haulm is standing, and to report to the Ministry at once if they have any suspicion that the crop is attacked by the Beetle. Any striped potato beetle, or any red or reddish-yellow grub that is feeding on potato leaves, should be regarded with apprehension, and a specimen should be forwarded immediately to the Ministry for identification. Copies of an illustrated leaflet, describing the Beetle, may be obtained from the Ministry. All communications should be addressed to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

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The Cultivation of Vegetables in Frames

MANY readers will remember the "French gardening" craze of some twenty years ago. The system was hailed as a certain avenue to easy fortune, and, in the popular imagination, the "cloche" was invested with almost magic qualities. The movement died away largely because unsuitable soils were commonly used, wrong varieties were planted, and haphazard marketing was only too often relied upon.

The demand for early vegetables and salads has, however, continued to increase, and recent developments as regards import duties on foreign produce have directed attention to the possibility of increasing supplies of home-grown early vegetables. To meet the demand for information, the Ministry has issued a Bulletin* that deals comprehensively with the production of salads and vegetables in frames and by the use of various protective devices.

Lettuce is naturally the crop that receives most attention, but due regard is given to other crops that are in demand and that respond to frame methods. The methods used in this country, and also in France and the Netherlands, where the industry is of great importance, are fully described. Particular care has been taken to indicate the varieties that have been found to give the best results in hot frames, cold frames and cloches respectively.

International Conference of Agricultural Economists

A NOTE, under this heading, appeared on page 396 of the August issue of this JOURNAL, announcing the holding of a Third International Conference at Bad Eilsen, Germany, from August 20 to 27. After the issue had gone to press, an intimation was received that, on account of the economic situation, and the inability of many leading speakers to attend, it had been found necessary to cancel the meeting this year. It is hoped that it will be possible to arrange for the Conference to take place next year.

* Bulletin No. 65, *The Cultivation of Vegetables in Frames*. Obtainable through any bookseller or from H.M. Stationery Office, price 1s. net (post free 1s. 2d.).

BOVINE CONTAGIOUS ABORTION

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Introduction.—The purpose of this article is to put before cattle-breeders and dairy farmers a brief résumé of existing knowledge on bovine contagious abortion, to outline the measures that should be practised to control and eradicate it, and to call attention to the heavy financial handicap with which farmers unwittingly burden themselves by allowing this *preventable* disease to exist and spread unchecked in their herds.

Bovine contagious abortion is probably the disease of greatest economic importance to stock-breeders in this country and is annually the cause, directly and indirectly, of enormous financial loss.

It is necessary to stress the cardinal importance of the disease to cattle owners, as its presence or absence frequently decides whether a herd will show an annual profit or loss, and no herd is properly organized if it does not include in its system of management provision for the prevention or control of this disease.

There is no denying the seriousness of the losses caused by contagious abortion: its incidence has been steadily increasing for many years and a high percentage of cows is now infected.

Live abortion vaccine, as at present prepared, has been extensively tested, and while it may confer some benefit, it will not eradicate the disease.

Stock-breeders are faced with a difficult problem and are called upon to make a definite decision. They must either allow abortion disease to spread unchecked in their herds, and resign themselves to continued heavy financial loss, or they must determine upon drastic action for its control. There is no easy middle course.

Causal Agent.—The causal agent of bovine contagious abortion is a germ known as the *Brucella abortus* (Bang, 1896), and more than 90 per cent. of abortions in cattle are the direct result of infection by this germ; a small percentage of abortions is caused by other organisms or by accidents.

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Age and Susceptibility.—Bovine animals of all ages and both sexes are susceptible to infection with *Br. abortus*; female animals are more susceptible than males, and pregnant animals are more susceptible than non-pregnant ones. Abortion may occur at any period between the first and the ninth month of pregnancy, but is more frequent during the second half. Calves that are born shortly before full term are frequently regarded as premature births, but it is an established fact that the majority of so-called "premature births" are in reality abortions caused by infection with *Br. abortus*.

Many infected cows acquire a tolerance to the disease following an abortion and carry their calves the normal period, yet *Br. abortus* can be recovered from the after-birth and from the alimentary tract of the calves. This type of cow provides a fruitful and usually unsuspected source through which the disease may be introduced to clean herds.

Symptoms.—The symptoms that precede the act of abortion are similar to, but less marked than, those that precede a normal calving; they are frequently so slight and transient as to pass unnoticed. If cows in infected herds are kept under close daily observation, symptoms varying in degree and duration may frequently be observed before abortion occurs. There is usually some swelling and reddening of the lips of the vulva and a slight mucous discharge, the udder increases in volume and this enlargement is accompanied by a small increase in the milk yield. There may be general uneasiness and some relaxation of the ligaments at the base of the tail. As the afterbirth is not firmly attached to the womb during the early months of pregnancy, it is usually expelled with the foetus when abortion occurs during that period; but in the later stages of pregnancy, the attachments being stronger, it is frequently retained.

Following abortion there is usually a brownish or yellowish-brown discharge from the genital tract, the duration of which depends on the severity of the pathological changes which have occurred in the womb and the response of that organ to the treatment adopted.

If the afterbirth is examined within a short time of expulsion, changes are sometimes present that may be of diagnostic value. Parts of the membranes that are normally thin and translucent are changed to a leathery texture and

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may be studded with small elevations, while the borders and " crypts " of the buttons may be covered with a cheesy material.

Diagnosis.—The correct diagnosis of the first case of contagious abortion in a herd is a matter of primary importance, as on its early recognition depends, to a large extent, the success of the measures taken subsequently for the eradication of the disease, and it has, therefore, a direct bearing on the extent of the financial loss that will be incurred by the owner.

An accurate diagnosis of contagious abortion can only be made by means of laboratory tests, and of these the most practical is known as the blood agglutination test.

This is a delicate serological test, which, in experienced and competent hands, is a method of great accuracy. Like all serological methods of diagnosis, however, it has its limitations; it is not one hundred per cent. accurate, but its repeated application, when combined with the elimination or segregation (isolation) of reactors, and the adoption of hygienic measures, is effective in eradicating the infection from herds.

The interval that elapses between the initial infection of an animal and the time when the blood test gives positive evidence of the disease may vary from seven days to five months; occasionally an infected animal fails to react to the test until some days after the act of abortion has occurred.

A " suspicious or doubtful reaction " may signify that the animal is in the initial stage of infection, or it may point to a transient infection that the animal will overcome. Suspicious reactors should be kept separate from non-reactors and re-tested after an interval of one month.

It is known that every animal that reacts to the test does not abort, but heifers that contract infection during their first pregnancy almost invariably abort or calve prematurely.

Virgin heifers that react to the test frequently recover if removed from contact with older cattle, but recoveries are rare once they have been served.

A small percentage of reacting animals, about 10 per cent., overcome infection in the course of time and make a complete recovery from the disease, but as this is a gradual process, and as it is impossible to foretell which animals will eventually recover, no practical use can be made of the knowledge.

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One blood test of a herd is unlikely to detect all infected animals, and on this account it is advisable to make the first two or three tests at intervals of four to six weeks.

In addition to the periodical herd test, blood samples from all cows in the clean portion of the herd should be tested between about the fourteenth and twenty-first day after calving.

Stock-breeders who are anxious to reduce the financial loss caused by contagious abortion cannot afford to remain indifferent to the valuable information provided by the blood test, as on it are based all methods of prevention and eradication of the disease. The knowledge of which cows are infected and which are healthy assists in limiting the spread of the disease and reducing financial loss. This information is particularly valuable at calving time, as it permits of special precautions being taken with known infected animals.

Method of Infection.—The interval that elapses between exposure to infection and the act of abortion is known as the period of incubation. In animals that have contracted the disease naturally it is usually from two to four months.

Infection is almost invariably contracted through the mouth by animals grazing on contaminated pastures or by the ingestion of food or water contaminated by the discharges of an affected animal.

Infection of calves commonly occurs through the ingestion of milk containing *Br. abortus*. The possibility of the disease being introduced to a herd through the medium of newly-purchased calves is one that should be borne in mind and guarded against.

Sites of Infection.—The causal agent, the *Br. abortus*, occurs in the pregnant uterus (womb), in the udder and the associated lymphatic glands, in the joints (usually knee or hock), in the generative organs of bulls, and in the intestines and internal organs of calves.

The germs are expelled by affected animals with the foetus, afterbirth, uterine discharge and milk.

Infection does not persist for long in the womb after the expulsion of the foetus, rarely longer than thirty days.

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Most heavily-infected cows expel the germs intermittently with the milk over long periods, and frequently throughout life. One or more quarters of the udder may be affected.

Bull.—The part played by the bull in the dissemination of contagious abortion has not yet been fully determined, and although it is improbable that he is an agent of primary importance, precautions should be taken against his becoming infected through association with affected females or through serving them shortly after they have aborted. In order to reduce the risk of bulls contracting the disease they should not be allowed to run free at pasture with cows in infected herds.

It has been proved that the *Br. abortus* can become localized in the genital organs and can be excreted with the seminal fluid.

It is possible that a bull may occasionally act as a mechanical carrier of infection by serving a recently aborted cow and shortly afterwards a healthy one, but as abortion germs persist for only a limited time, rarely longer than thirty days, in the womb after the foetus has been expelled, danger from this source can be obviated by not having cows served until at least two months after abortion has occurred.

There should be little danger to healthy bulls in serving affected cows provided this period is strictly enforced.

Bulls that react to the blood test should not be used for breeding purposes, but should be fattened or sold out of the herd.

Calves.—It is an established fact, and of great practical importance, that up to a certain age calves are relatively resistant to infection with *Br. abortus*. The age at which they become strongly susceptible appears to be closely connected with the development of the reproductive organs. When carrying out an eradication policy, only animals over twelve months of age need be submitted to the blood test.

Calves, the progeny of infected cows, may carry the *Br. abortus* in the intestines and other organs at birth, but the majority of them overcome the infection within a relatively short period; it has been estimated that about 10 per cent. of calves become permanently infected.

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Calves fed on milk containing *Br. abortus* harbour infection until such time as the infected milk is discontinued, when usually within a few months the germs are eliminated from the system and the animal ceases to react to the blood test.

Calves should, as far as possible, be fed on milk from non-reacting cows. It has been proved that when milk containing *Br. abortus* is ingested by calves the germs pass unaltered through the intestinal tract and can, in this way, contaminate pastures and foodstuffs, thus providing a connecting link between the germs present in the udder of the carrier cow and adult susceptible animals.

The fact that calves, even when the progeny of infected stock, are resistant to infection with *Br. abortus* until their reproductive organs are developed, facilitates the building up of an abortion-free herd.

Calves should be separated after weaning from infected stock in order that they may overcome the disease before being placed with the non-reacting portion of the herd.

Immunity.—A few cows appear to be naturally immune to infection with *Br. abortus* and a small number develop an immunity following abortion. The majority of cows that have aborted do not develop complete immunity, but merely a tolerance to the infection. This tolerance allows infected cows to give birth to full-term, living calves, but does not prevent them harbouring abortion germs in the system and excreting them in enormous numbers at the time of calving.

The great majority of infected animals of breeding age become permanent carriers of the *Br. abortus* and remain reactors to the blood test.

Reduced Milk Yield.—The most serious economic aspect of abortion disease is the marked decrease in the milk production of infected herds. While estimates as to the extent of the decrease vary, it is common knowledge that there is a marked reduction in the milk yield of an abortion-infected as compared with an abortion-free herd. The earlier the stage of gestation at which abortion occurs the smaller is the subsequent milk yield. Some observers estimate the average loss to be about one quart of milk per cow per day, while others state that the milk yield of infected herds is about 25 per cent. below normal. The

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reduction in the milk yield as the direct result of infection with *Br. abortus* is undoubtedly great, and many infected animals are maintained at a loss.

Comparative experiments carried out over a number of years on abortion-infected and on clean herds showed the average financial loss for each milking period as the result of abortion to be not less than £10 per head.

The milk from affected udders is usually normal in appearance, but microscopical examination shows a high cell content, and the presence of the *Br. abortus* can be demonstrated by appropriate laboratory methods.

While there is as yet no evidence that the disease can be transmitted from an affected to a healthy udder by the hands of milkers or by milking machines, it is a possibility that should not be ignored.

Control of the Disease.—It must be acknowledged that no serious attempt is being made in Great Britain to eradicate bovine contagious abortion, although it is a *preventable* disease and its eradication could be successfully achieved on many farms without any immediate heavy financial outlay.

The accumulated experience of many years has proved that in herds of any considerable size there is no tendency for the disease to "die out." The policy of *doing nothing* in the hope that this would occur has been freely advocated in the past, and was based on the knowledge that the majority of animals, as the result of abortion, acquired a tolerance to the infection. No consideration was given to the fact that young stock coming into the herd would contract the disease and allow of the infection being carried on from generation to generation. Furthermore, the great reduction in the milk yield of infected animals definitely rules out this method on economic grounds; in addition, retained afterbirth and sterility occur with considerably greater frequency in infected as compared with abortion-free herds.

The policy of *doing nothing* is the worst and most costly to follow; it reduces profits, frequently brings financial disaster in its wake, and must in a large measure be held responsible for the present widespread incidence of the disease.

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The scheme of control that is now being practised in various parts of the world is applicable only to "stationary herds" and not to "flying herds."*

In this country probably more than 30 per cent. of the herds are sufficiently self-contained to allow of an eradication policy being practised.

It is clear that with the widespread incidence of contagious abortion it would be impossible to purchase cows on any considerable scale in the open market without the repeated reintroduction of the disease.

In "flying herds" immunization with live vaccine may be practised until such time as the general incidence of the disease in the country has been reduced to more manageable proportions and other measures of control become economically practicable.

The eradication of contagious abortion from "stationary herds" presents no technical difficulties. The repeated application at short intervals of the blood test and the disposal of reacting animals, combined with hygienic measures, will eradicate the disease within a reasonable time. Nevertheless, the eradication of the disease under the restrictive economic conditions imposed by the modern system of dairy farming (milk contracts, replacements, etc.) is not without difficulty and cannot usually be achieved in a short time.

It should be remembered that the economy effected by the eradication of abortion disease will be many times greater than that achieved by the general practice of continually buying and selling cows in order to keep the milk output at the constant level necessary for obtaining the highest contract price.

In the system of control as now practised the eradication of the disease is being attempted in a gradual manner, while maintaining for variable periods on the same premises such infected animals as are profitable.

The measures to be adopted are few, simple and inexpensive, and are readily incorporated into the ordinary routine management of a herd. If conscientiously carried out they will permit of the early detection of infected animals, gradually reduce the intensity of infection, and will lead eventually to the eradication of the disease.

* Flying herds" are those to which newly purchased cattle are frequently added. "Stationary herds" are those in which replacements are made from young stock bred on the farm, and to which few newly purchased animals, other than bulls, are added.

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The general principle to be followed is the separation of animals which react (" reactors "), from animals which do not react (" non-reactors ") to the blood test, and the gradual replacement of the diseased animals by healthy young stock bred on the farm.

Slight modification in the details of the scheme will be required from one farm to another, depending on the type and value of the herd, method of farming, class of business conducted and the building accommodation available.

It is essential before deciding on the details of the scheme to be practised on any particular farm to consider fully these various points, and in addition to ascertain the amount of infection present by means of a preliminary blood test of all bovine animals over twelve months of age.

The period during which it is necessary to blood test and segregate is relatively limited, as the method is merely a temporary expedient for carrying on with infected animals until an opportune time arrives for their disposal and replacement by healthy young stock.

It should be noted that following the initial test of an infected herd, and the separation of reactors from non-reactors, it sometimes happens that for a time most of the abortions occur in the clean herd, the explanation being that certain animals had been recently exposed to infection and were at the time of testing in the incubative stage of the disease. A second blood test made after an interval of from four to six weeks will detect these recently-infected animals.

When the preliminary blood test reveals only a small number of infected animals, their immediate disposal is unquestionably the soundest economic policy to pursue.

When two farms are available, the problem of dealing with abortion disease is relatively simple. On receipt of the laboratory report the non-reactors should be placed on one farm and the reactors on the other. The two herds should be treated, as regards attendants, pastures, utensils, etc., from then onwards, and until the last reacting animal has been disposed of, as two completely separate units.

While favourable circumstances of this type are admittedly not numerous, there are, nevertheless, many owners with two or more farms whose herds are heavily infected, and the gradual eradication of the disease from which would devolve into a simple matter of testing and re-organization.

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A common type of infected farm is that on which two or more cattle sheds are available. The usual principle is followed of blood testing all animals over twelve months of age, and in the case of the adult cattle, housing the non-reactors in one shed and the reactors in the other. Separate pastures and water supply, and, if possible, attendants, should be provided for the two herds. Precautions should be taken against the transmission of infection from the reactors to the clean cattle through the hands, clothes or boots of attendants, or through feeding utensils, etc.

There is more difficulty in controlling the disease on a farm where only one cattle shed is available, and unless the reactors are immediately disposed of, the eradication of the disease in these circumstances is extremely difficult. It might at first sight appear as if little could be done, but extensive field experience has proved that by the practice of certain precautions the intensity of the disease can be gradually and progressively reduced, many susceptible animals can be safeguarded from infection, and in consequence considerable financial loss can be averted. As soon as the results of the preliminary blood tests are received, the non-reactors should be placed at the upper end of the shed and the reactors at the lower end, i.e., at the end nearer the outlet of the drainage channel.

When practicable a temporary partition should be erected between the two portions of the herd in order to prevent infected animals wandering in among the clean animals. The clean portion of the herd should, as far as possible, be milked and fed before the infected, and separate feeding utensils should be used for the two sections.

There can be small hope of eradicating the disease or even reducing the degree of infection if reactors and non-reactors are kept on the same pastures.

It is essential that reactors should not be allowed to calve in the shed, as although they may give birth to normal calves, the afterbirth and the discharges from the womb contain the *Br. abortus* in enormous numbers. Where facilities permit, all cows, non-reactors as well as reactors, should be removed from the shed a few days before full term and placed in a calving box, or, if calving boxes are not available, even in a barn or stable.

During the grazing season, all in-calf animals in infected herds should be brought into the yard before full term and kept there for fourteen days after calving.

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Calving time is the time of greatest danger, the period during which infection is generally disseminated.

The length of time required for the eradication of the disease from a herd will depend on the initial degree of infection, on the facilities existing for the separation of non-reactors from reactors, and on the thoroughness with which the problem is tackled.

It is not possible in the space available to refer in detail to the varying conditions that obtain under different systems of farming and that may influence the eradication of the disease, but stock-breeders who are unwilling to resign themselves to continued financial loss, and who decide to undertake an eradication campaign, will no doubt evolve effective expedients which will stop possible channels of infection, increase the efficacy of the measures practised, and hasten the elimination of infection.

It is certain that no owner will undertake the precautionary measures necessary for the control of the disease, no matter how simple they may be, unless he recognizes that he will derive some material benefit from his efforts. It can be truly said that the financial benefit he will derive from the control of this disease will be substantial and will exceed out of all proportion any efforts he may make.

Calving Boxes.—The most dangerous period for the dissemination of abortion germs is immediately before, and for about fourteen days after, the act of abortion. In order to limit the spread of infection during this period special calving boxes or an isolated shed or barn should be provided on every farm, into which all cows should be moved a week before they are due to calve. The calving boxes or shed should be constructed so as to be easily cleaned and disinfected; any isolated shed or stable which has an impermeable floor and smooth walls can be adapted for this purpose by subdividing it into separate stalls. The calving boxes provided should be sufficient to accommodate the number of cows likely to calve at any one time.

Isolation at the time of calving is particularly advisable in the case of cows that are positive reactors to the blood test, in order to prevent the spread of the abortion germs excreted by them at this period.

All cows should be kept in the calving boxes for a minimum period of fourteen days after parturition, and until all discharge has ceased.

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When a cow aborts in a shed she should be immediately removed to an isolation box, and the foetus and afterbirth placed in a water-tight container and taken to a suitable place for burning or burial.

Each calving box should be thoroughly cleaned and disinfected after use. It is important that cows should not have access to manure heaps; particularly manure from the isolation calving boxes.

The Non-reacting Section of the Herd.—The intervals at which the non-reacting section of the herd should be submitted to the blood test will depend on various circumstances, the principal of which is the intensity of the infection revealed by the preliminary blood test. When the infection is heavy, it is advisable to carry out a couple of tests at short intervals.

As a general rule, two tests at intervals of a month or six weeks followed by tests every three or four months during the first year give satisfactory results. At the end of that period the interval between tests can be reconsidered in the light of the results obtained.

The Infected Herd.—A “carrier” is an animal that harbours *Br. abortus* germs in some part of the body. All animals that react strongly to the blood test are carriers.

Animals that give a positive reaction to the blood test should be disposed of at the first favourable opportunity as they tend gradually to become unprofitable.

As soon as the results of the tests are received from the laboratory the reactors should be separated from the non-reactors and severely culled.

The history of all animals should be carefully scrutinized, and those giving a low milk yield, or that are barren, or otherwise unprofitable, should be marked for early disposal.

The value to the owner of reactors that calve normally will depend on either their breeding value or on their milk production. In view of the constant risk of infected animals spreading the disease, only those that give a good milk yield, leaving a reasonable margin of profit after paying for their keep, justify the substantial risk of retaining them in the herd.

It is doubtful if any advantage is gained by re-testing reactors; although it is recognized that a small number re-

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cover completely from the infection, it is never safe to return them to the clean section of the herd.

Replacements. — The addition of newly-purchased breeding stock to a herd is *the* most dangerous channel for the introduction of abortion disease.

While it is inevitable that new blood must be introduced from time to time, buying-in should be reduced to the lowest possible minimum compatible with the maintenance of the milk yield and the breeding efficiency of the herd.

The most dangerous animal to introduce is the in-calf heifer or cow. It has already been mentioned that a small percentage of infected animals fail to react to the blood test until *after* calving.

When the introduction of new animals is unavoidable, virgin heifers or empty cows should be selected, and they should be subjected to two blood tests, at an interval of one month, before being allowed to mix with a clean herd. Newly-purchased bulls and animals returning from shows should be subjected to exactly the same procedure.

The safest animals to add to clean herds are non-reacting calves from non-reacting dams. Pregnant animals should not be added to a herd until they have passed a negative blood test at least two weeks subsequent to calving.

In view of the great risk of introducing abortion disease with newly-purchased animals far more attention should be paid by stock-breeders to this aspect of the problem, and breeding stock should be purchased subject to passing the blood test. It should be understood, however, that while a single blood test of a recently-purchased animal of unknown history is of considerable value, it is not a complete guarantee that the animal is free from infection.

There is an increasing insistence by buyers for both the home and export trade that cattle must be free from abortion disease; the only adult animals that come definitely into that category are those from abortion-free herds.

Milking. — In view of the fact that a high percentage of infected cows carry *Br. abortus* germs in the udder and excrete them with the milk, the dangerous and insanitary practice of drawing the first milk on to the ground should be discontinued.

Infected milk contaminating hay or other feeding stuffs is a probable source of the disease. It should be a routine

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practice on every farm to collect the first milk from each animal in a vessel reserved for that purpose, and it should later be disposed of in a safe manner.

Water Supply.—Ponds or other water supplies should be fenced so that animals are prevented from wading or standing in them, as, apart from being insanitary, such a practice provides a dangerous channel for the dissemination of the causal agents of contagious abortion and of Johne's disease.

Land.—Fields that have been grazed by infected cattle should be left vacant for three months before non-reacting, adult animals are allowed on them.

Fences should be strong and sufficiently high to prevent any contact between reactor and non-reactor animals.

Vaccination: Dead Vaccine.—The extensive trial of dead abortion vaccine has proved that it confers little, if any, protection against the disease. It gives owners a false sense of security and induces them to relax the ordinary hygienic precautions that are essential adjuncts to all methods of disease control.

Live Vaccine.—As the purpose of this article is to outline a workable scheme for the eradication of abortion disease from stationary herds, it is not proposed to discuss here live abortion vaccine.

It will be sufficient to mention that the regular and continued use of live vaccine does not bring about the eradication of the disease, and it has, therefore, no place in the system here described.

Further, it may be laid down as a general principle that it is not in the best interests of the owner to use live vaccine on stationary herds.

Nutrition.—There is no reliable evidence that diet has any influence on contagious abortion, or that resistance to the disease can be enhanced by increasing the mineral or other nutritional reserves of breeding stock.

Medicinal Treatment.—The harassed cattle owner has in the past provided a bountiful harvest for the vendors of alleged medicinal cures or preventives for contagious abortion.

It should be clearly understood that there is no drug nor mixture of drugs that has been found to be of the slightest value for the cure or for the prevention of this disease, and that money spent in this direction is wasted.

Disinfection.—It cannot be too strongly emphasized that, if success is to be obtained in the control and eradication of abortion disease, greater attention must be paid to general hygienic measures.

The resistance of the *Br. abortus* to disinfectants and climatic conditions varies with its surroundings. The organism does not generally live for any considerable length of time outside the animal body, but when protected from adverse conditions, as when present in manure or pieces of afterbirth in dark, damp sheds, it is capable of remaining viable for some months.

Buildings should be thoroughly cleaned and disinfected at frequent intervals.

Yards to which cattle have access should be kept free from litter and manure, and should occasionally be dressed with powdered quicklime. Manure should not be piled outside cattle sheds, but should be removed daily to a fenced manure dump some distance away.

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Identification of Animals.—In herds where the eradication of abortion disease is being carried out by blood testing and segregation, it is essential that all animals should have a permanent identification mark. The most practical and satisfactory method of marking cattle is by ear-tattoo.

Sterility.—Sterility and irregular breeding are the result of the absence of function or of suspended function in some part of the reproductive system of the cow or bull. The problem is one of great complexity, and it is frequently difficult and sometimes impossible to determine which part of the system is at fault; even when the site of the trouble has been located, the causal factor may remain obscure and treatment be unsuccessful.

Sterility is one of the most serious problems confronting the cattle industry, and it is a frequent sequel to contagious abortion. It occurs also in abortion-free herds, but in this country abortion infection is, directly or indirectly, responsible for a considerable percentage of cases.

It occasionally results from primary infection with *Br. abortus*, but is more usually associated with contaminating germs that gain entrance to a womb inflamed and damaged as the result of abortion infection.

Sterility following abortion appears to be intimately associated with retained afterbirth, which is itself a common sequel to abortion during the later stages of pregnancy; retained afterbirth, however, occurs also in herds free from abortion disease. Retention of the afterbirth is a more serious condition than is generally recognized, and it is a sound policy to obtain professional assistance when it occurs.

When abortion takes place, the inner lining of the womb is inflamed as the result of the infection and is at this stage admirably suited for the propagation of the contaminating germs that abound in nature; and when in addition the afterbirth is retained, the chances of these germs gaining entrance to the womb are greatly increased. The resulting infection may not only cause injury to the womb, but may extend more deeply into the genital tract or reach the ovaries and set up a pathological condition that frequently causes permanent sterility.

The influence of nutrition as a factor in sterility has not yet been determined. It is probable that a diet deficient in certain minerals or vitamins may give rise to sterility, but the minimum content of these substances compatible with reproduction is not known, and it is, therefore, difficult to assess the influence of the nutritional factor as a cause of sterility in animals given average diets.

Sterile animals are a definite liability to the owner, and the earlier they are recognized and disposed of the smaller will be the financial loss.

THE COST OF A WEANER

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WHAT has a pig cost the farmer by the time that it has reached weaning age, that is, at eight weeks old? The Pig Reorganization Commission recommend 25s. as being a representative and fair figure. The cost figures, given below, show that, even when the number of weaners, raised annually by a sow, has been less than the Commission's estimate of sixteen, and after all items of expenditure have been considered, it is still possible to produce a weaned pig for substantially less than 25s. These details of cost refer to pigs bred and reared on the Lord Wandsworth Agricultural College Farm on the North Hampshire Downs, with the farm's costing records and accounts supplying the particulars necessary for their compilation.

Under the system adopted on this farm, the breeding herd, running in large grass paddocks provided with wooden or corrugated iron shelters, is maintained in open-air conditions for the greater part of the year. The sows are brought into sties adjoining the paddocks in order to farrow down. As soon as possible after farrowing, the sow and her litter are removed to a smaller grass enclosure and remain there until ready for weaning. The weaners are then transferred to the fattening premises, which, being practically half a mile away from the breeding sties, can be regarded as a separate unit. The sows are mated as soon as possible and return to the larger grass paddocks until their next farrowing. The practice adopted on this farm of allowing the pigs to run out to grass at an early age has undoubtedly considerably reduced the mortality, so often common among young sucking pigs, and probably accounts in some measure for the relatively high figure obtained, as compared with that yielded under the East Anglian Pig Recording Scheme, for the average number of weaners raised per sow.

Middle White Boars, and Large Black, Large White and Wessex Saddleback sows are employed, since the aim in

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recent years of uncertain prices has been to produce a type to serve both pork and bacon markets' requirements if necessary. In addition to grass, the breeding stock receive a supplementary meal ration, the actual amount given varying according to the relative abundance or scarcity of the grazing, the stage of gestation, and, when suckling, the age and size of the litter. The constituents of this ration are purchased according to their unit price and then mixed on the farm; they consist very largely of milling offals, rice meal and maize meal, with a small addition of soya-bean meal and fish meal to supply the protein and mineral requirements of the pig.

The system of separate premises for breeding and fattening, combined with the cost accounting, provides a distinct advantage from the point of view of one who is endeavouring to compile accurate costs, for it makes it possible to determine accurately the total weight and cost of the food consumed by the breeding herd.

The costs included in Table I relate to two consecutive periods of a year in each case, from April 1, 1931, to March 31, 1932, and from April 1, 1932, to March 31, 1933.

TABLE I.

Items of Cost	1931-32				1932-33			
	Total Cost		Cost per Weaner	Per-centage of Total Cost	Total Cost		Cost per Weaner	Per-centage of Total Cost
	£	s. d.	Shillings		£	s. d.	Shillings	
Food ...	218	6 0	12'841	72'51	185	0 8	9'868	67'05
Labour ...	53	15 6	3'163	17'86	56	18 10½	3'037	20'63
General Expenses	1	15 0	0'103	0'58	2	8	0'007	0'05
Depreciation of Appliances	15	11 6	0'916	5'17	15	11 6	0'831	5'64
Establishment Charge	11	13 0	0'685	3'88	18	5 6½	0'975	6'63
Total ...	301	1 0	17'708	100'00	275	19 3	14'718	100'00
Total Weaners Raised	340				375			
Average Weaners per Sow	14'78				16'30			

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It is important to note that:—

- (a) The "Food" item includes rent of 13 acres of pasture and any home-grown food given to the pigs. The latter is charged at *market price* and all purchased foods at cost at the *piggery*, thereby including all rail expenses and cartage costs from station to farm.
- (b) The "Labour" item includes a proportion of the attendant's annual wage, half the annual rental of his cottage, and a charge for any manual and horse labour employed by the pig-breeding department. One man attends to both breeding and fattening herds, but, since no detailed time-sheet is kept, it has been impossible to decide with absolute accuracy what proportion of his time is spent at either premises. Nevertheless, by judicious inquiry and personal observation, it can be said with confidence that, taking an average throughout the year, one-third of his day is employed in attending to the breeding stock. Accordingly, this proportion of his annual wage has been charged to the breeding department.
- (c) "Depreciation" does not include the decrease in value during the year of the cheaper pig appliances, such as buckets. These are regarded as items of recurring expense and are included under the heading of "General Expenses."
- (d) The breeding herd bears half of the total "Establishment Charge" accorded to the pig department as a whole. This latter charge is apportioned over the farm on the basis of manual and horse labour employed by the individual departments.
- (e) No credit is allowed to the pig account for the manure produced, but, on the other hand, no charge is made for straw.
- (f) No mention is made of an appreciation or a depreciation in the value of the breeding herd, which is as far as possible maintained at a constant strength of 23 sows and a boar by drafting in gilts to take the place of old sows sold after a brief fattening period. Actually, however, in each of the years under review, there was a slight appreciation in the value of the stock as a result of these changes, but no account has been taken of it in arriving at the above figures of cost, since it is tolerably certain that, had it been possible to record the value of meal consumed by the sows during their more or less brief fattening period, it would have counter-balanced the increase in value of the herd as a whole. Unfortunately no account of their actual meal consumption could be kept, because the old sows, drafted out of the herd, were transferred to the fattening premises and from that time fed from the same bucket as the porkers or baconers.

A scrutiny of the above figures readily reveals the influence exerted on the final cost of the weaner by two factors:—

- (a) the average size of the litters obtained during the year, and
- (b) the total cost of the food consumed.

For instance, if the sows had produced as many pigs in 1931-32 as they did in the following year—375—the cost of each weaner would have been reduced by 1s. 6d. Perhaps the importance of this factor can be more forcibly demonstrated in the following way. Taking the 1932-33 figures, the total cost of maintaining the breeding herd was £275 19s. 3d., so that the cost per sow was almost exactly

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£12, the cost of maintenance of the boar and gilts being thus borne equally by the sows. This cost is as follows:—

Food	..	..	..	..	..	£8	1	0
Overheads		..	..	..	..	3	19	0
Total						£12	0	0

Taking that figure as a basis, Table II shows how rapidly the cost per weaner increases as the number of weaners raised per sow per annum falls:—

TABLE II.					Cost of weaner.	
<i>Weaners raised per sow per annum.</i>					<i>s.</i>	<i>d.</i>
20	..	..	..	..	12	0
18	..	..	..	..	13	4
16	..	..	..	..	15	0
14	..	..	..	..	17	1
12	..	..	..	..	20	0
10	..	..	..	..	24	0
8	..	..	..	..	30	0

Actually, in the case of sows raising larger litters, the cost per weaner would be slightly greater than is shown in Table II, for, although a constant total food cost has been presumed in this case, irrespective of the size of the litter, in practice, sows suckling a larger number of pigs would receive an appreciably larger meal ration. This minor point should be not be allowed, however, to obscure the main point, which hardly calls for further amplification.

While the lower cost per weaner in 1932-33 was obviously due largely to a higher litter average of weaned pigs, nevertheless this decrease was in part brought about by a lower total food cost. The latter was affected not, as one might suppose, by a lower price per ton paid for purchased meals (actually the average price per ton was £6 3s. 2d. in 1931-32, and of £6 3s. 10d. in the following year) but by economy exercised in the actual weight of meal given to the breeding stock. This was accomplished without detriment to the sows or young pigs.

In conclusion, therefore, it would not be unreasonable to assume that there are grounds for the farmer, with the right type of healthy breeding stock, with suitable accommodation, and—probably most important of all—a sound knowledge of the management and feeding of pigs—to regard the Pig Reorganization Commission's estimate of 25s. as at least reasonable.

THE FORMATION OF GRASS TURF FOR POULTRY

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THERE is practically no published information regarding the capacity of different grass species to stand up to the treading and grazing of domestic poultry. Research work has been carried out upon the reaction of graminaceous plants to cattle, sheep, and horses, but the conclusions reached do not necessarily apply to grazing by poultry. There are several reasons for this. In the first place considerable numbers of birds in this country are more or less closely confined, with the result that their treading is much more intensive. Secondly, birds graze and tread turf in a manner very different from other farm stock. Thirdly, the droppings of poultry are relatively rich in nitrogen, and this has a direct influence upon growth. Finally, and perhaps most important of all from a practical point of view, poultry in pens are run year after year upon the same small area of turf, which may consequently receive no differential grazing.

In order to discover what grasses will best withstand the effects of long-continued and heavy stocking by poultry, some preliminary experiments were begun at the National Institute of Poultry Husbandry in 1931, in co-operation with the then Director, Dr. Parkhurst, and the Assistant Director, Mr. H. Howes. Some small cockerel pens were set aside for the experiment, dug over, and sown down in April with heavy seedings of certain grasses. The idea was to obtain as thick a turf as possible of each species, sown alone, and then to run birds upon the "mats" and observe results. It was, in effect, a test to destruction.

The choice of the species to be tested was not an easy one, for the amount of space available was limited, and thorough replication of the plots was desired. Certain popular farm grasses, such as Cocksfoot, Timothy and Tall Oat grass, were easily excluded. These species, under the stimulus of poultry droppings, become tufted and run very much to stem. They not only impede the movement and exercise of birds but shade the dwarfer species of grass and

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necessitate much mowing if they are not to render the pens unsightly (Figs. 1, 2). They should never be included in prescriptions for poultry turf.

The following species were tested alone: Perennial Rye-grass (both commercial and indigenous), Rough-stalked Meadow-grass, Smooth-stalked Meadow-grass, Crested Dogtail, Hard Fescue, and Fiorin. They were sown down at the rate of just over 1 oz. of seed per sq. yd., and the plots were replicated seven times. An excellent plant resulted. Birds were run in during the autumn. Observations were made upon the way in which the various species behaved under the occupation of the birds, and how they recovered when the birds were withdrawn.

Fiorin.—It soon became obvious that Fiorin was not suited to the conditions. It very rapidly became scratched up, turned brown and practically disappeared.

Hard Fescue also was unsatisfactory and died out quickly in some of the "mats." In view of the fact that in some other, non-experimental, pens this species persists quite well, one does not feel justified in dismissing it entirely as unsuitable.

Rye-grasses.—Individual plants of Rye-grasses, both commercial and indigenous, stood up to the hard wear quite well, but in the mass the species tended to become patchy and tufted. This seems to be the chief disadvantage of the species, and the peculiarity is more marked on some soils than on others. Although Perennial Rye-grass is an easy and cheap species to establish, there is evidence to show that by itself it is not altogether satisfactory for poultry turf. A close bottom grass is necessary to fill in the spaces between the tufts, especially of the commercial type.

Crested Dogtail, despite the fact that it takes longer to establish itself than the rye grasses, emerged from the test with distinction. It withstood the treading and always looked healthy. Its winter-green habit makes it very desirable.

Meadow Grasses.—The Meadow grasses also gave very satisfactory results, especially the Rough-stalked species. It formed a close, compact turf in marked contrast to some of the other species. It was favoured by the weather, which was rather wet. During the early part of 1933, which was very dry, it did not show to the same advantage as the Smooth-stalked species.

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Whilst these experiments were in progress, good reports were received from a poultry farm in Derbyshire, where Smooth-stalked Meadow-grass and Creeping Bent (or "Brown Top"), in equal parts, have been used to sow down poultry runs.

Observations made during the past few years upon a great number of old-established poultry runs showed that the better class turf nearly always contained a large proportion of Meadow grasses and Perennial Rye-grass.

Other Herbage.—Simultaneously with the experiments described above, other pens were sown down with certain non-gramineous species, both pure and in mixture, such as Rib-grass (*Plantago lanceolata*), Broad-leaved Plantain (*Plantago major*) and Yarrow (*Achillea millefolium*), in an effort to find other herbage capable of withstanding excessive treading. The runs taken over were partly bare, and contained many tufts of Cocksfoot and Tall Fescue. On part of the area the tufts were cut off with a spade to ground level, but on the rest of the pen they were left, and the soil between was scratched with a Planet Junior cultivator. Seed was sown and rolled in with a very light roller manipulated as best as possible between the tufts. Despite this very primitive preparation of the soil a good plant was obtained: the point is of some importance since it shows that expensive cultivation is not essential to the renovation of existing turf in poultry runs, and because it emphasizes the fact that the establishment of grass in the runs is less difficult than its maintenance.

In this pen, corroboration of the previous experience with Dogstail and the Meadow grasses was obtained. These three species formed a very useful sward.

The Yarrow, and Yarrow plus Rib-grass sections of this pen offer, in 1933, food for thought. The Yarrow has formed a dense, springy turf, very green in contrast with the rather burnt-up grassed areas, and it seems to stand up to the treading very well indeed. It is a plant that deserves further trial, and will be strongly represented in the forthcoming experimental programme.

The Rib-grass alone seems to have no prospects, except possibly on the very driest of soils.

In the spring of 1933 some bare areas around some houses were sown down with a heavy application of hand-gathered seed of the Greater Plantain. It is a common observation that this plant is found abundantly in the

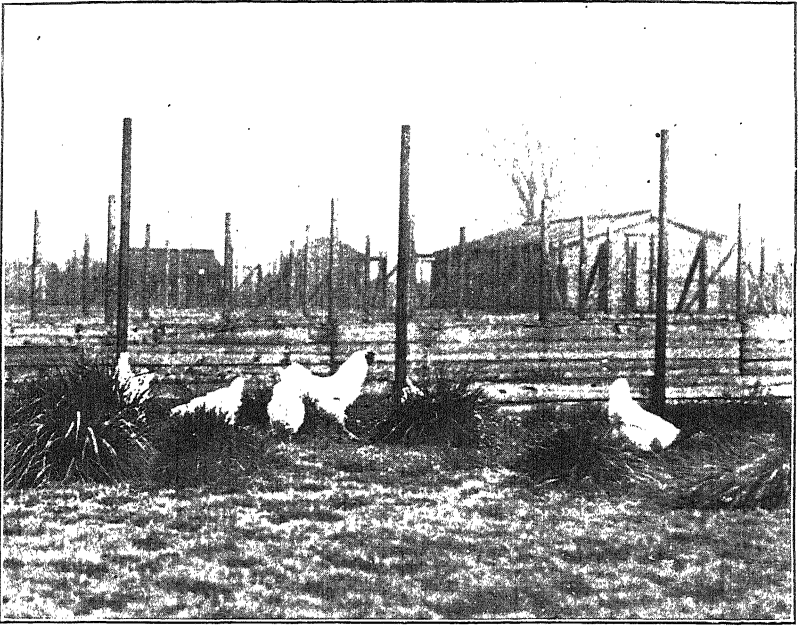


FIG. 1.—Result of sowing Tall Fescue and Cocksfoot. In summer the tufts became enormous and seriously interfered with the exercise of the birds.

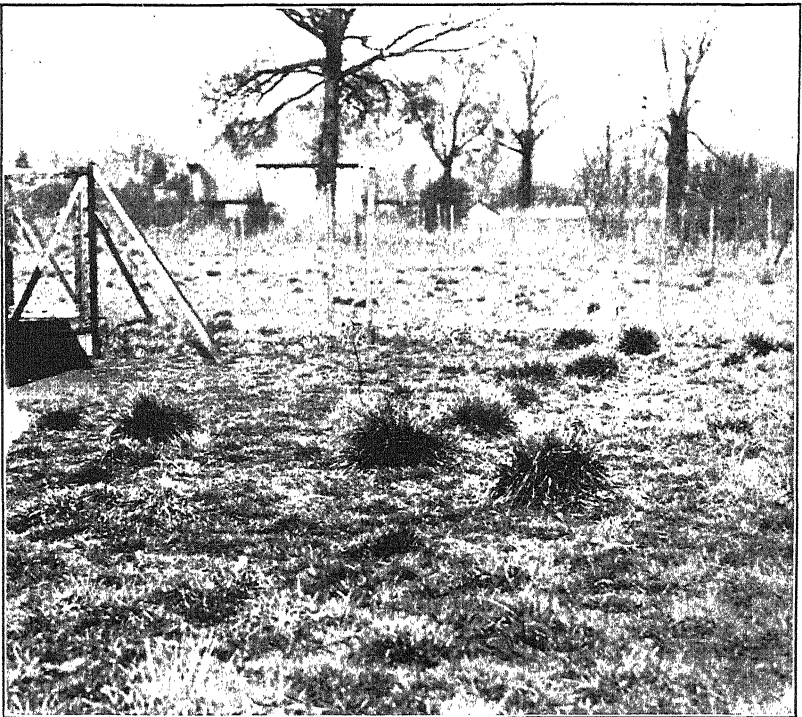


FIG. 2.—Typical poultry turf in winter. The tufts in the foreground are of Tall Fescue; those in the background are chiefly Cocksfoot.

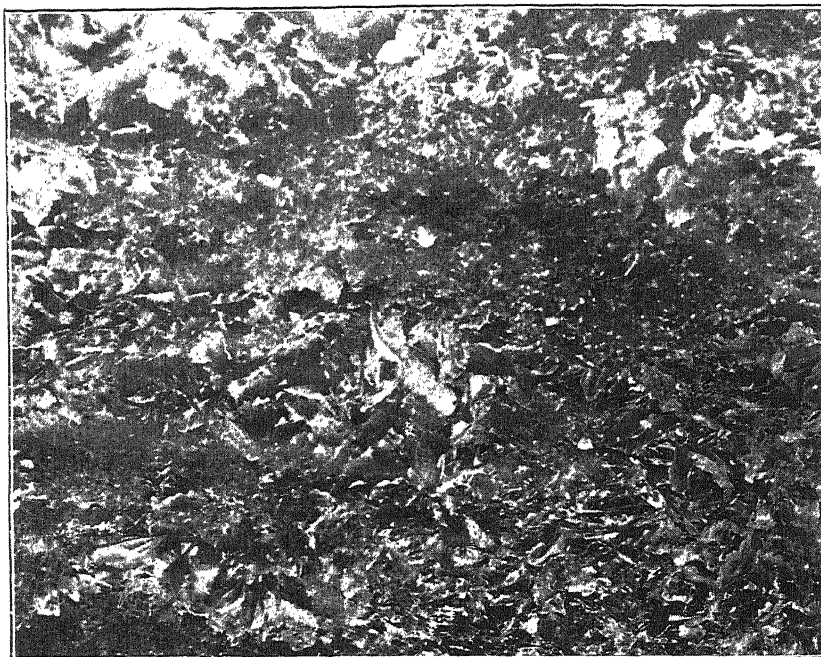


FIG. 3.—Turf in a duck pen at the Harper Adams College Laying Trials.
Broad-leaved Plantain occupies a very considerable area.



FIG. 4.—Turf in a pen, originally occupied by ducks, in which the herbage was similar to that shown in Fig. 3. Laying hens subsequently occupied the pen for 4 years, during which time the Plantain disappeared.

GRASS TURF FOR POULTRY

neighbourhood of gateways and other places where treading is excessive: in order to find out if it will stand up to heavy poultry treading an area extending about 3-4 feet beyond two poultry houses has been sown with it. It is not suggested that the plant should be used over other parts of the poultry run as it is unsightly, but a margin of plantain immediately adjacent to the house would be an asset, provided it could keep the ground covered.

It is possible that Broad-leaved Plantain will not be successful in this: its behaviour under poultry is different from its behaviour under ducks. In the duck section of the Harper Adams Laying Trials the pens are characterized by a strong growth of Broad-leaved Plantain and Mayweed, which is in sharp contrast with the flora of the pens occupied by poultry. The peculiar flat tread of ducks apparently so consolidates the soil that the normal grass population is succeeded by these two intruders. A typical piece of ground from a duck pen is shown in Fig. 3. Some four years ago, several of these duck pens were taken over for hens. The flora of these pens has, during those years, completely changed. The Mayweed has almost totally disappeared and the Plantain, except in one case, is no longer to be found. A photograph of the turf in a pen which formerly carried ducks and which has carried hens for four or five years is shown in Fig. 4. The contrast between this and Fig. 3 is remarkable.

In touching upon the varying influence of different types of poultry upon turf, it may be useful to refer to the effect of geese. Geese, of course, cannot be closely confined, as they soon foul the land in such circumstances. They have, however, a remarkably beneficial effect upon turf if run as a flying flock and not kept too long on any one area of ground. This effect has been repeatedly noted at the National Institute of Poultry Husbandry, and attempts are being made to use the birds as a corrective to the bad results that follow from running poultry continuously upon the same land. Geese are vigorous grazers, and defoliate grasses close to the ground after the manner of ruminant animals. On account of this habit, and possibly also partly as a result of the different chemical composition of their excreta, geese encourage a vigorous, dense, very succulent growth of grass, which contrasts strongly with the herbage of pens occupied solely by ducks or poultry. In spring, the pens grazed by geese take on the appearance of plots

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intensively manured with nitrogen and closely grazed by mixed stock.

Another rather puzzling problem under investigation relates to the marked differences in vigour between the turf of adjoining poultry pens—differences which are most marked in laying trials. It is a common observation that the grass of some pens becomes long and luxuriant whilst in others the turf is bared down throughout the season. One explanation attributes the cause to breed differences, especially the differences between heavy and light breeds. There is undoubtedly a tendency for the heavy breeds to be more severe upon turf than the light breeds, area for area, but the weight of the birds alone cannot be the cause of the differences in vigour of the turf, since the contrasts are sometimes as distinct in adjoining pens of the same breed as they are between pens housing different breeds.

In order to determine whether there was any connexion between the state of the turf and the number of eggs laid per pen of birds, a careful examination of over 230 pens on the Harper Adams Laying Trials was carried out early in June, 1932. At that date the differences between the various pens were most conspicuous. The trials had then been in operation for eight months.

The pens were graded as follows: *Bare*, where the turf was in the condition associated with severe grazing by sheep. *Bare to Medium*, with grass up to three inches long. *Medium*, with grass between three and six inches long, *Medium to Long*, with grass between six and twelve inches long, and *Long* above a foot in length. In working out the results, however, only two extreme grades were recognized, namely, *Bare-Medium* and *Medium-Long*. The observations were made without attention to the number of birds in the pens, or to the breed; nor was anything known about the egg production of the pens until after the examination had been made.

Some of the pen results had to be omitted owing to the death of one or more birds, or to slight irregularities in area. It was considered that the death of a bird, owing to the consequent reduction in grazing and treading, seriously impaired the accuracy of any observations upon the state of the grass in the pen.

In the Small Flock section there are seven birds per pen, with approximately 22 square yards of run per bird. In

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regard to the Rhode Island Red breed the following figures were obtained:—

<i>Pens.</i>	<i>State of Turf.</i>	<i>Average Total Egg Production.</i>
11	Medium-Long	832.2
15	Bare-Medium	886.1

There was therefore a surplus of 53.9 eggs per pen in those runs in which the turf was relatively short and bare. It is not unreasonable, in the absence of any other explanation, to assume that the extra egg production has had something to do with the extra demands on the turf.

The data for the other breeds are not so satisfactory owing to the small number of absolutely intact pens available: they tend in the same direction, however, and the figures are given for what they are worth:—

<i>Pens.</i>	<i>State of Turf.</i>	<i>Average Total Egg Production.</i>	<i>Breed.</i>
13	Bare-Medium	935.2	White Wyandotte
3	Medium-Long	977.0	„ „
2	Bare-Medium	854.0	Light Sussex
6	Medium-Long	770.0	„ „
2	Bare-Medium	969.0	White Leghorn
15	Medium-Long	860.3	„ „

As these figures relate to one season only they must be accepted with reserve. The nature of the stocking during one season, for example, may have a considerable effect upon the turf the following year.

The closer one investigates the action of poultry upon turf the more complicated does the problem appear to become. For example, in some feeding experiments recently conducted to discover the value of all-mash feeding compared with pellets, it was observed that the birds receiving pellets were more severe in their effects upon the turf than those getting the same rations in mash form. It was not possible to measure the difference, and there is a possibility that other factors were at work, although at the time none could be determined. The point is worth mentioning, since other observers may have noticed the same thing, and because it illustrates the necessity for more extended investigations upon the reaction of grass to poultry. In this, as in so many other investigations at the present time, lack of funds is the limiting factor.

LIVE STOCK IMPROVEMENT SCHEME

Report for the Year ended March 31, 1933

THE reduction in the grants available for the Ministry's Live Stock Improvement Scheme, to which reference was made last year, and the low level of prices in the live-stock industry have been to some extent reflected in the results of the Scheme for the year under review. The Live Stock Scheme aims at grading up the commercial stock of the country by bringing home to farmers the importance of using sound pedigree sires of good type and conformation, and of keeping accurate milk records of dairy cows. The Scheme was started primarily for the benefit of the small farmer, who, with his limited resources, has found it increasingly difficult to make ends meet. His aim has been to reduce expenditure wherever possible, and he has been but little disposed to incur additional liabilities in fresh directions, however conducive to development they may promise to be. The small farmer cannot obtain the advantages offered by the Ministry's Live-Stock Scheme without some cost to himself. Although grants are paid by the Ministry in respect of the bulls and boars provided under the Scheme, the purchase of the pedigree sires entails some outlay on the part of the farmers who undertake the provision of the animals. On the other hand, however highly the advantages of official milk recording may be valued, there is a great temptation, when search is being made for some means of reducing outgoings, to resign membership of the local Milk Recording Society. When a reduction in the Government grants is combined with a pressing need for diminished spending on the part of the farmer, it is not surprising that enthusiasm for the Scheme should not be at its highest level. There are, however, some signs of a more optimistic feeling among stock-rearers as a result of the Government's agricultural policy, and it may be hoped that the turn of the tide is near.

The Ministry has recently prepared, in consultation with the Central Council of Milk Recording Societies, Regulations* relating to Sampling and Testing for Butter-Fat, and

* These Regulations have been printed and are at present available as a separate pamphlet. Copies may be obtained as indicated on p. 536.

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these Regulations will come into force on October 1, 1933. Hitherto, although testing for butter-fat has been an optional activity on the part of Milk Recording Societies, the Ministry has not included in its Milk Recording Scheme, apart from some general rules as to procedure in sampling, Regulations relating to butter-fat testing, and Societies have not carried on this work under any uniform system. The Regulations prescribe, *inter alia*, the independent testing of milk samples by a properly qualified person, the conditions under which samples are to be taken, the method of calculating the percentage of fat, the procedure relating to the issue of certificates by the Societies, and the taking of additional samples in special instances. Milk Recording Societies will not be obliged to adopt the Ministry's Scheme for butter-fat testing, but the Secretary of a Society will not be authorized to certify any statement of the result of a butter-fat test unless the Society has adopted the Scheme. Testing for butter-fat will remain optional on the part of individual members of the Societies that have adopted the Scheme. Members will not be permitted to enter in their Annual Registers the results of any butter-fat tests that have been made other than in accordance with the Ministry's Regulations. The Scheme will be available for both "daily" and "weekly" weighers.

The Ottawa Agreements Act, 1932, extended the facilities previously provided for the importation into Great Britain of Canadian store cattle to all Canadian cattle, and at the same time powers were given to the Minister of Agriculture and Fisheries to require the slaughter of any such cattle if, in his opinion, they could be used for breeding and were not suitable for that purpose. Since January 16, 1933, when these extended facilities came into force, all Canadian cattle landed in Great Britain have been inspected by Live-Stock Officers of the Ministry or of the Department of Agriculture for Scotland, to determine whether the cattle capable of being used for breeding were of a sufficiently high standard to permit of their unrestricted entry into this country.

The number of cargoes of Canadian cattle landed under the new conditions up to March 31, 1933, was 14, of which 11 were discharged at Birkenhead and 3 at Glasgow. Steers accounted for 5,076 out of the 6,543 cattle imported, while bulls numbered 216; cows 191; heifers 1,054; and calves 6. Of the 216 bulls, 21 were landed at Birkenhead and 20

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of these were slaughtered as unsuitable for breeding, while at Glasgow 195 bulls were landed and 111 slaughtered for the same reason. A large proportion of the bulls passed as suitable for breeding were slaughtered in the landing place or licensed out of the landing place to slaughterhouses. Three cows and 31 heifers landed at Birkenhead and 6 cows landed at Glasgow were slaughtered as unsuitable for breeding.

Bulls.—The depressing conditions prevalent in the cattle-breeding industry throughout the year 1932-33 are reflected to some extent in the working of the Ministry's premium bull scheme during this period. Although 1,500 bull grants were available, the number of societies owning bulls fell below this figure by March, 1933, and at that date there were 1,452 subsidized bulls as compared with 1,494 in the previous year. The number of grants that lapsed during the period under review was larger than usual, and the reason given in many instances was that the bull owners were not in a financial position to provide approved pedigree bulls. In a number of districts the Ministry's Live-Stock Officers were faced with reluctance on the part of suitable custodians to purchase approved bulls for new societies, and it was evident that usually the farmer's first thought was to find means to reduce his expenditure rather than to enter into fresh commitments. When all the conditions of a year marked by disastrous values for live stock are borne in mind, there is some satisfaction in noting that the setback that the Ministry's premium bull scheme has experienced is comparatively slight, and there is no reason to doubt that the popularity that the scheme enjoys among farmers will lead to renewed progress in its development as soon as some degree of prosperity returns to cattle-breeders.

The table on page 519 gives the number of premium bulls located under the scheme since its commencement.

The average number of services per bull during the year 1932-33 was 66, which is the same as was reported for the year 1931-32. The average number of services in Wales was 72 and in England 64. The total number of cows served by the premium bulls during the year was 96,491 as against 100,011 in 1931-32 and 95,429 in 1930-31. Cow-owners who sent cows to the subsidized bulls numbered 23,514, an average of 16 per bull for England and Wales, the average for England being 15 and for Wales 20.

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NUMBER OF BULLS SUBSIDIZED EACH YEAR SINCE THE COMMENCEMENT
OF THE SCHEME.

<i>Year</i> (April 1-Mar. 31.)	<i>No. of</i> <i>bulls.</i>	<i>Year</i> (April 1-Mar. 31.)	<i>No. of</i> <i>bulls.</i>
1914-15	497	1924-25	1,069
1915-16	633	1925-26	1,175
1916-17	659	1926-27	1,287
1917-18	710	1927-28	1,372
1918-19	721	1928-29	1,408
1919-20	675	1929-30	1,476
1920-21	668	1930-31	1,537
1921-22	847	1931-32	1,494
1922-23	947	1932-33	1,452
1923-24	978		

Attention has been called in previous reports to the varying degree of interest taken by farmers in the premium bull scheme in different parts of the country, and the difficulty experienced in some areas in keeping groups of small farmers loyal in their support of the bull located in their district. While it is still true that farmers in the western and south-western counties of England and in Wales, where the number of small farmers rearing cattle is proportionately larger than in most of the other parts of the country, constitute the warmest supporters of the scheme, there is some evidence that the knowledge of the approach of bull licensing and that a demand for a better quality bull will follow, is leading to interest being taken in the Ministry's scheme in areas where premium bulls have not hitherto been located.

The voluntary schemes for the marking of calves sired by premium bulls, which have been started in various districts, continue to make satisfactory progress, in spite of the unfavourable prevalent conditions, which naturally have a limiting effect on the enthusiasm that it is possible to evoke among farmers for new schemes that call upon them for even very modest payments. There is evidence that the ear-marked bull calves fetch higher prices in the local markets than calves not so marked. In the Bletchley and District Live-Stock Improvement Society the ear-marking of the female progeny of the premium bulls located by the affiliated societies is encouraged by the fact that only officially ear-marked females are eligible for entry at the Society's Show. Farmers in Brecon, Radnor and Monmouth continue to support the Welsh Dragon Mark Store Cattle Association, and it is evident that the scheme for improving the sale of young stock by tattooing a Welsh Dragon in the ear of calves sired by the premium bulls is popular both among breeders and buyers. At the same

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time it is reported that in some districts farmers would reap fuller advantage from the use of the premium bulls if more care were taken with the rearing of the calves, so that, when marketed as stores, they would be better grown and in more satisfactory condition.

The educative value of the higher prices realized by the progeny of premium bulls is undoubtedly considerable, as is also the success of the bulls and the stock sired by them at agricultural shows. The list of prizes won during 1932-33 is again a lengthy one and particular mention may be made of the outstanding successes gained by premium bulls exhibited at the Royal Welsh Show, at Llandrindod. "Hean Outpost 2nd" won in the beef Shorthorn class and was eventually awarded the championship. Two Dairy Shorthorn premium bulls secured first and second place in their class at the same show and one of them won the Prince of Wales' Championship medal for Dairy Shorthorn cattle; also in the Welsh Black Cattle Section the premium bull "Egryn Buddugol" took the first prize in his class and was champion of this breed. Of the numerous successes in the English districts may be mentioned a Shorthorn premium bull in Yorkshire that has won in all 30 first prizes at local shows and has only been beaten twice in the whole of his show career. The champion Devon bull at the Bath and West and Southern Counties Show was sired by a premium bull. At the Royal Cornwall Show several first prizes were won by premium bulls and their progeny, as was also the special prize for the best pedigree Shorthorn bull in Devon and Cornwall calved on or after January 1, 1930. The Champion and Reserve Champion beasts at the Birmingham Fat Stock Show were sired by premium bulls. The examples of the successes at shows that have been mentioned are clear evidence of the quality of some of the bulls that are available for small farmers at low service fees under the Ministry's scheme, and of the valuable results obtained from the use of these bulls in the production of high-grade stock.

Breeds and Prices.—The number and prices of the premium bulls according to breeds are given in the table (page 521) for each of the last three years. The general fall in prices for live stock is reflected in the prices paid for premium bulls, and it will be seen that the average price of £43 1s. 9d. for bulls located on March 31, 1933, shows a considerable drop as compared with £46 6s. 5d. for the

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previous year and approximately £48 for the 1930-31 season. The only breeds that showed an increase in price were the Aberdeen-Angus and the Sussex, of which breeds, however, few bulls are located. Shorthorns declined from £46 11s. *od.* to £43 4s. *od.*, Herefords from £44 18s. *od.* to £41 12s. *od.*, Devons from £52 2s. *od.* to £49 0s. *od.*, Lincolnshire Reds from £46 6s. *od.* to £43 7s. *od.*, Welsh Blacks from £32 15s. *od.* to £30 5s. *od.* and Guernseys from £43 19s. *od.* to £42 0s. *od.* Owing to the reduced prices for pedigree stock, custodians were able to obtain bulls of good quality throughout the year at comparatively low prices.

NUMBERS AND AVERAGE PRICES OF BULLS OF EACH BREED.

Breed	1930-31			1931-32			1932-33					
	No.	Average price			No.	Average price			No.	Average price		
		£	s.	d.		£	s.	d.		£	s.	d.
Aberdeen-Angus	10	47	15	10	8	43	15	6	5	46	12	10
British Friesian	3	65	4	0	3	65	4	0	1	52	10	0
Devon - -	183	53	12	2	185	52	2	2	183	49	0	10
Galloway - -	2	24	11	6	2	36	2	6	2	36	2	6
Guernsey- -	17	43	11	10	20	43	18	10	23	41	19	7
Hereford - -	186	47	1	6	193	44	18	2	205	41	12	3
Lincoln Red -	175	49	2	10	162	46	6	4	152	43	6	10
Red Poll - -	1	42	0	0	1	40	0	0	2	38	7	6
Shorthorn - -	842	48	4	1	795	46	11	4	757	43	4	0
South Devon -	8	54	19	3	9	52	17	3	11	51	6	7
Sussex - -	7	41	5	3	7	34	16	3	8	36	15	3
Welsh Black -	31	81	3	5	69	32	15	5	72	30	5	4
All Breeds	1,505	47	19	6	1,454	46	6	5	1,421*	43	1	9

* 1,452 bulls were located, but grants in respect of 31 were in suspense at the end of the year.

There is no outstanding change in the relative number of the different breeds to be recorded for 1932-33. The choice of breed is a matter for the Societies, and, apart from the requirement that the bull chosen is of the same breed and type as the majority of the cows that it is intended to bring to him for service, the Ministry does not attempt to influence the Societies in their selection of breeds. Although the proportion of Shorthorns in the total number of bulls subsidized decreased to a small extent, this breed with 757 bulls accounted for 53 per cent. of the premium bulls pro-

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vided under the Scheme. The number of Herefords increased from 193 to 205 while Lincoln Reds declined from 162 to 152.

Service Fees.—The service fees charged for the use of the premium bulls are shown below:—

Year.	2/6	3/-	3/6	4/-	4/6	5/-	5/6	6/-	6/6
1930-31 ..	70	53	46	111	13	896	12	126	10
1931-32 ..	71	57	45	128	13	846	12	119	12
1932-33 ..	76	54	59	129	16	830	8	108	13

Year.	7/-	7/6	8/-	8/6	9/-	9/6	10/-	10/6
1930-31 ..	4	144	6	2	—	—	10	2
1931-32 ..	4	130	6	2	—	—	8	1
1932-33 ..	3	110	6	1	—	—	7	1

The tendency for service fees to be reduced continues. The number at 7s. 6d. and over was 125 as compared with 147 in the previous year, and the number at 5s. fell from 846 to 830, while the total number over 5s. declined from 294 to 257. The number under 5s. in 1932-33 increased to 334 as compared with the 1931-32 total of 314. The average service fee in Wales is low, and of the 384 Welsh Societies only 11 charged a service fee above 5s.

Boars.—The number of premium boars in service at the end of March, 1933, was 973, or 27 less than the authorized number of 1,000 and 51 less than a year earlier. The following table shows the number of boars in respect of which grants have been paid each year:—

NUMBER OF BOARS SUBSIDIZED EACH YEAR SINCE THE COMMENCEMENT OF THE SCHEME.

<i>Year</i> (April 1-Mar. 31).	<i>No. of</i> <i>boars.</i>	<i>Year</i> (April 1-Mar. 31.)	<i>No. of</i> <i>boars.</i>
1914-15	115	1924-25	655
1915-16	193	1925-26	710
1916-17	216	1926-27	844
1917-18	264	1927-28	907
1918-19	350	1928-29	933
1919-20	399	1929-30	972
1920-21	441	1930-31	1,047
1921-22	550	1931-32	1,024
1922-23	569	1932-33	973
1923-24	638		

As a result of poor prices for pigs, interest in pig breeding was at a low ebb at the beginning of 1932-33 and this state of affairs was reflected in the reduction in the number of premium boars that were put into service. A more hopeful feeling developed towards the end of the period under review, as a result of the belief that the pig trade might

LIVE STOCK IMPROVEMENT REPORT

improve with the assistance given to it by the agricultural policy of the Government.

With the decrease in pig breeding, the average number of services per boar declined from 64 to 58. The highest averages were in Wales, where an over-all average of 74 services per boar was reached, while in England only the Division comprising Gloucester and Hereford reached an average of 70. The over-all average for England was 53.

The Ministry continues to receive reports of the improvement in the quality of pigs in districts where approved boars have been located for a few years, and it is clear that, although premium boars account for only approximately 4 per cent. of the total number of boars in the country, their effect in improving the stock of the ordinary pig-keepers is much greater than might be expected from this low percentage. It is frequently observed that pigs sent to market from a district where premium boars have been located are much superior in quality to competing animals from districts that have not had the advantages of the use of premium boars. Pigs sired by premium boars were again prize-winners at various shows, and it is worthy of special note that the progeny of a premium boar won 1st and 3rd prizes at Smithfield Shows, and that a premium boar sired the pigs that were converted into the sides of bacon that won the Bledisloe Bacon Challenge Cup at the London Dairy Show in October, 1932.

Breeds and Prices.—The table (top of page 524) shows the number and average prices of boars of each breed located under the Ministry's scheme in each of the last three years.

The predominating influence of the Large White continues to increase, and of the 86 new grants made in 1932-33, 78 were in respect of Large Whites. During the year several applications were made to change from a boar of another breed to Large White and in all instances permission was given. Although the total number of premium boars in use has declined, the number of Large Whites has increased from 769 to 802, and boars of this breed constitute 84 per cent. of the total number of premium boars. In 1931-32 the percentage was 77, and five years ago was only 61. The impressive change-over to Large Whites in the last few years has taken place at the expense of the other breeds, and has no doubt been brought about in a large measure by the advice given to farmers with regard to the

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NUMBER AND AVERAGE PRICES OF BOARS OF EACH BREED.

Breed	1930-31				1931-32				1932-33			
	No.	Average price			No.	Average price			No.	Average price		
		£	s.	d.		£	s.	d.		£	s.	d.
Berkshire - - -	20	12	14	5	18	11	7	1	10	10	6	1
Cumberland - - -	51	13	8	8	39	12	1	6	23	10	9	11
Essex - - -	—	—	—	—	—	—	—	—	2	9	4	0
Gloucester Old Spots -	2	20	5	0	2	15	5	0	2	15	5	0
Large Black - - -	37	11	19	6	35	11	1	8	22	10	8	8
Large White - - -	775	13	8	5	769	12	12	4	802	10	13	11
Large White Ulster -	5	13	12	0	3	15	0	0	1	12	0	0
Lincoln Curly Coated -	17	11	11	9	17	9	19	1	8	7	14	3
Long White Lop-eared	51	13	9	7	42	12	12	10	29	11	15	4
Middle White - - -	57	12	19	4	59	12	10	6	35	11	7	7
Tamworth - - -	1	9	0	0	—	—	—	—	—	—	—	—
Wessex Saddleback -	8	13	1	2	10	11	10	11	7	10	11	5
Welsh- - -	9	12	12	11	8	13	2	5	13	10	17	0
All breeds	1,033	13	6	11	1,000	12	9	7	954*	10	14	5

* 973 boars were located, but grants in respect of 19 were in suspense at the end of the year.

best commercial pig. In this respect the farmer has been quick to follow a definite lead when it has been offered to him authoritatively.

The decline in the average price paid for premium boars continued, and at the end of the year the average price that had been given for the boars then in location was £10 14s. od., as compared with £12 9s. od. in 1931-32 and £13 6s. od. in 1930-31. Boars of all breeds showed a decline in price, the fall in Large Whites being from £12 12s. od. in 1931-32 to £10 14s. od. in the year under review.

Service Fees.—The following table shows the range of service fees during the last three years. The distribution for 1932-33 shows no marked difference from that obtaining in the previous two years:—

Year.	2/6	3/-	3/6	4/-	4/6	5/-
1930-31	3	9	20	76	9	751
1931-32	3	10	26	75	8	725
1932-33	3	10	21	84	5	705
Year.	5/6	6/-	6/6	7/-	7/6	10/-
1930-31	2	78	5	2	69	9
1931-32	1	75	3	3	65	6
1932-33	2	60	3	2	55	4

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The number of pig-keepers who sent sows for service to the premium boars was approximately 25,000, the average number sending to a boar being 25; for Wales this average was 36, while in England the average was 22.

Rams.—Thirty grants for Welsh Mountain rams were available for 1932-33, but only twenty-two were taken up. Flockmasters experienced a trying time in view of the precipitate fall in prices during the year, and the slump was the more severely felt because sheep owners had become accustomed to regard sheep as a fairly sure source of profit.

The hiring fees for rams under the Scheme ranged from £6 15s. to £15, the latter fee being in respect of the ram that won the Championship prize at the Royal Welsh Show. The number of ewes served averaged 60 per ram. One new society was formed during the year, and four societies completed their twelfth year of operations.

Horse Breeding.—*Heavy Horses.*—An increasing interest in heavy-horse breeding is being taken throughout the country, and the agricultural returns show that the number of foals from heavy horses in England and Wales on June 3, 1933, was about 27,600, as compared with 25,000 in 1932 and 23,900 in 1931. The encouragement given to breeders by the Ministry's heavy-horse breeding scheme helped farmers to maintain breeding during years of low prices, and the evidence of a possible shortage of suitable young horses indicated by the better prices now obtainable is a useful testimony to the value of the Scheme.

The financial crisis made it necessary to reduce the provision available for the assistance of heavy-horse breeding in 1932. The maximum direct grant per stallion was reduced from £60 to £40 and the maximum grant for assisted nominations was brought down from £40 to £30. It was also not found possible to provide for any increase in the number of grants for stallions over the number available in 1931. The slight apparent increase from 159 to 162 shown in the following table was due to the fact that a few of the grants were divided between two stallions in order to meet the convenience of certain societies in the award of assisted nominations for additional stallions travelled by them.

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HEAVY HORSE SCHEME.

Service Season.	No. of Stallions.	Total No. of Mares served.	Average No. of Mares served.	No. of Assisted Nominations.	Average Hiring Fee of Stallions.	Average Service Fee.
					£	£ s. d.
1914 ..	72	6,365	68	1,503	231	2 8 6
1915 ..	97	9,122	94	2,430	241	2 9 6
1916 ..	108	9,995	92	2,181	244	2 11 0
1917 ..	110	10,556	96	2,151	258	2 16 3
1918 ..	122	12,281	100	2,165	285	2 15 8
1919 ..	118	10,920	96	1,996	317	3 6 3
1920 ..	105	9,133	87	1,839	345	3 13 1
1921 ..	101	7,888	78	1,943	333	3 13 7
1924 ..	87	6,098	70	*	178	2 7 0
1925 ..	96	7,413	77	1,723	194	2 8 4
1926 ..	98	8,165	83	2,171	208	2 8 6
1927 ..	105	8,950	85	2,599	211	2 8 9
1928 ..	114	9,792	86	2,805	217	2 9 4
1929 ..	120	10,196	85	3,052	221	2 9 9
1930 ..	140	12,248	87	3,604	239	2 11 1
1931 ..	159	14,226	89	4,266	235	2 10 2
1932 ..	162	14,624	90	3,945	226	2 9 9

* No grant was made by the Ministry for assisted nominations (except to the Cumberland and Westmorland Society) for the service season 1924.

The above figures do not include those relating to the Cumberland and Westmorland Society, which issues assisted nominations to selected stallions travelled by their owners in these counties. The numbers of such nominations issued by this Society each year since its formation in 1915 have been as follows:—

Service Season.	No. of Assisted Nominations.	Service Season.	No. of Assisted Nominations.
1915 ..	385	1925 ..	197
1916 ..	394	1926 ..	220
1917 ..	328	1927 ..	247
1918 ..	321	1928 ..	281
1919 ..	264	1929 ..	283
1920 ..	254	1930 ..	269
1921 ..	255	1931 ..	290
1924 ..	121	1932 ..	198

It will be seen from the above table that the average number of mares served per stallion shows a further small increase and is now 5 more per stallion than in 1929. The average increase in 1932 is due to an increase in England from 84 to 87 mares per stallion, while in Wales there was a decrease from 106 to 100.

The total number of services, including those in Cumberland and Westmorland, was 14,822, which is an increase of 306 compared with the year 1931, and is the largest

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number for any year since the Scheme was inaugurated. The reduced grants available resulted in a decline of assisted nominations awarded to small farmers, 4,143 being granted in 1932 as compared with 4,556 in 1931. The figure for 1931, however, constituted a record and, apart from that year, the number of assisted nominations granted in 1932 exceeds those granted in any previous year.

There were 128 Shire stallions, 20 Clydesdale stallions and 14 Suffolk stallions subsidized in 1932, as compared with 126 Shires, 20 Clydesdales and 13 Suffolks in 1931.

The circumstances under which the Heavy-Horse Societies work differ very considerably, and the hiring fees that they are able to pay for their stallions show a wide variation. The societies show great keenness in their efforts to obtain the best available stallions that their means will allow, and some of the more prosperous societies travel stallions of outstanding merit. In 1932 the hiring fees ranged from £115 to £400 as compared with £120 to £420 in 1931, with an average of £226 as against £235 in 1931. The average service fee in 1932 showed a slight decrease at £2 9s. 9d. as compared with £2 10s. 2d. in 1931.

From reports that reach the Ministry it is clear that the heavy-horse breeding scheme is much appreciated, and that it is fully realized that without the existence of the Heavy-Horse Societies, stallions of really good quality would rarely be available for small farmers who wish to breed good foals from their mares, at fees within their means. In an account* of a show held by the Stowmarket and Central Suffolk Farmers' Club it was stated:—

“ But there were other reasons for the all-round excellence of the show and the well-filled classes of Suffolks. Nothing has proved a greater contributing factor to this end than the Ministry of Agriculture's heavy-horse grants, and particularly the assisted nominations. Through this means the smaller farmers have been induced to secure the services of the best stallions, and to their credit, to breed foals to take their place with the best in the county. This aspect of the show must not be lost sight of. If ever concrete proof was forthcoming that the Ministry's live-stock grants were being made good use of, it was plainly evident at Stowmarket on Saturday as well as at Framlingham and Halesworth earlier in the week. Suffolk horse breeders have therefore every reason to urge that, even at a time when it is so essential to practise economy, it is against the interests of heavy horse breeding not to encourage the smaller men by making increased provision for assisted nominations, whereby the best stallions are made available to those unable to afford the full fees.”

* *East Anglian Daily Times*, July 18, 1932.

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Foals sired by subsidized stallions won a number of prizes at local shows held in 1931.

The returns furnished to the Ministry to show the foaling results of the services of subsidized stallions travelled in 1931 indicate that the number of mares proving to be in foal was 59 per cent. of the number served, as against 58.2 per cent. in 1930.

Horse Breeding Act, 1918.—There was a small increase in the number of stallions licensed under the Horse Breeding Act for the service season of 1932. The number of licences issued for that season was 1,477 as compared with 1,432 for 1931. The number of instances in which licences were refused was 45, as compared with 38 in respect of 1931 and 42 in respect of 1930. The comparatively small number of refusals in recent years is a clear indication that the Act has been successful in practically eliminating the unsound stallion. The number of licences issued and the number of refusals in each year since the Act came into force have been as follows:—

<i>Year (ending October 31).</i>	<i>No. of Applica- tions for Licences.</i>	<i>No. of Licences issued.</i>	<i>No. of refusals.</i>
1920	4,153	3,749	404
1921	4,060	3,816	244
1922	3,644	3,479	165
1923	2,897	2,761	136
1924	2,285	2,210	75
1925	1,908	1,849	59
1926	1,664	1,608	56
1927	1,574	1,537	37
1928	1,454	1,414	40
1929	1,472	1,436	36
1930	1,472	1,430	42
1931	1,470	1,432	38
1932	1,522	1,477	45

There was again a decrease in the number of light stallions licensed, but this decrease was more than counter-balanced by the increase in heavy stallions. The licences issued in respect of these latter amounted to 1,211 as compared with 1,103 for the season 1931, while the number of light stallions and ponies licensed was 266 as against 329 during the season 1931.

The table (page 529) shows the number of stallions of each breed or type licensed for the seasons 1931 and 1932.

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NUMBERS OF LICENCES GRANTED UNDER THE HORSE BREEDING ACT,
1918, IN ENGLAND AND WALES, 1931 AND 1932.

BREED OR TYPE	PEDIGREE (i.e. Stallions entered or accepted for entry in the recognized Stud Book of their Breed)		NON-PEDIGREE (i.e. Stallions not entered or accepted for entry in a recognized Stud Book)		TOTALS OF EACH BREED AND TYPE (Pedigree and Non-Pedigree)	
	1931	1932	1931	1932	1931	1932
Heavy						
Shire -	704	781	57	72	761	853
Clydesdale -	118	114	10	16	128	130
Suffolk -	131	134	3	2	134	136
Percheron -	47	54	1	3	48	57
Others -	—	—	32	35	32	35
<i>Total Heavy Horses</i>	1,000	1,083	103	128	1,103	1,211
Light						
Hackney -	22	20	4	4	26	24
Thoroughbred	186	163	2	3	188	166
Arab -	8	5	3	3	11	8
Cleveland Bay	5	3	—	—	5	3
Welsh Roadster	1	1	3	—	4	1
Hunter -	2	2	1	1	3	3
Yorkshire Coach	1	1	—	—	1	1
Others -	—	—	6	9	6	9
<i>Total Light Horses</i>	225	195	19	20	244	215
Ponies & Cobs						
Welsh -	11	7	1	—	12	7
Fell -	10	1	1	—	11	1
Dales -	10	8	2	3	12	11
Polo and Riding -	9	8	1	—	10	8
Shetland -	7	4	—	—	7	4
Welsh Cob -	23	14	8	5	31	19
New Forest -	—	1	—	—	—	1
Highland -	2	—	—	—	2	—
<i>Total Ponies and Cobs</i>	72	43	13	8	85	51
TOTALS -	1,297	1,321	135	156	1,432	1,477

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The number of stallions rejected for each of the prescribed diseases and defects was as follows:—

Whistling	16	Ringbone	2
Sidebone	9	Bone Spavin	2
Roaring	8	Stringhalt	1
Shivering	4	Defective Genital	
Cataract	2	Organs	1

Appeals against refusals were lodged in 7 cases, of which 3 were successful.

The number of instances in which infringement of the Horse Breeding Act was reported to the Ministry during the year was 19. The reports received related to 4 unlicensed stallions that were being travelled for service or exhibited for service on premises not in the occupation of the stallion owner, and to 15 licensed stallions that were being travelled or exhibited for service unaccompanied by the licences. Proceedings were taken in two instances; in the others the owners and leaders of the stallions were warned that the requirements of the Act must be complied with.

Milk Recording.—The following table sets out the number of members of Milk Recording Societies in each year since 1917-18, when all Societies were required to adopt a uniform milk-recording year, together with the number of herds and cows recorded:—

<i>Year ended</i>	<i>Societies.</i>	<i>Members.</i>	<i>Herds.</i>	<i>Cows.</i>
<i>October 1.</i>				
1917-18	27	639	708	19,793
1918-19	38	1,191	1,332	37,880
1919-20	46	2,075	2,312	61,323
1920-21	52	3,328	3,664	97,903
1921-22	55	3,949	4,362	117,023
1922-23	55	4,365	4,767	127,151
1923-24	52	4,764	5,209	138,086
1924-25	50	5,081	5,516	148,905
1925-26	49	5,174	5,656	154,322
1926-27	51	5,166	5,650	156,847
1927-28	50	4,862	5,320	149,971
1928-29	50	4,616	5,065	144,812
1929-30	49	4,501	4,934	140,266
1930-31	49	4,412	4,836	137,866
1931-32	49	4,267	4,682	135,912

The gradual decline in membership of Milk Recording Societies and the reduction in the number of herds recorded, which has been commented upon at length in previous reports, continues. Societies still find it difficult to obtain new members, willing to incur the additional modest expenditure necessitated by membership of the Societies, to

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take the place of those who resign. It is known, however, that many of the cow-keepers who resign their membership of Milk Recording Societies are fully aware of the advantage of keeping accurate records and continue to record privately. At the same time, private records have not the commercial value of official records that are checked under the supervision of a Milk Recording Society and, given an improvement in the financial position of farmers, Milk Recording Societies might hope to recover the ground that they have lost.

Average Yield of Recorded Cows.—In 1930-31 the record average yield of 719 gallons per cow was established, and while this very high average yield was not maintained in 1931-32, the average of 709 gallons obtained can be considered as very satisfactory having regard to the circumstances that prevailed during the year. It will be recalled that most of the hay crop of 1931 was badly weathered and was generally of inferior quality. Moreover, the low prices fixed for the winter milk and the sharp rise that took place in the price of feeding stuffs in the autumn of 1931 contributed to the reduction in the average yield.

The number and average yield of milk of all cows recorded, and of full-year cows, for each year since 1917-18 is given in the following table:—

Year October 1 to October 1	Particulars of all cows and heifers recorded			Particulars of cows recorded for full year			
	No. of cows and heifers	Total yield	Average yield*	No. of cows	Per- centage of total cows and heifers	Total yield	Average yield*
		Gal.	Gal.			Gal.	Gal.
1917-18	19,793	8,426,958	426	8,775	44	5,255,923	599
1918-19	37,880	16,204,941	450	17,989	47	10,543,516	579
1919-20	61,323	29,344,887	479	27,266	44	17,363,347	637
1920-21	97,903	48,512,380	495	48,248	49	30,892,620	640
1921-22	117,023	60,463,617	517	63,318	54	41,208,073	651
1922-23	127,151	67,904,224	534	68,349	54	46,956,565	687
1923-24	138,086	73,963,165	535	73,338	53	50,299,884	685
1924-25	148,905	76,419,498	*513	77,132	51	51,695,291	*670
1925-26	154,322	81,623,788	*529	81,669	53	56,102,434	*687
1926-27	156,847	82,161,809	*524	81,749	52	55,677,261	*681
1927-28	149,971	76,896,131	*513	77,171	51	51,931,633	*673
1928-29	144,812	75,948,485	*524	74,171	51	51,207,594	*690
1929-30	140,266	75,293,001	*537	71,432	51	50,766,464	*711
1930-31	137,866	75,357,035	*547	71,480	52	51,386,105	*719
1931-32	135,912	73,793,049	*543	70,826	52	50,243,265	*709

* Before 1924-25 the average yield was calculated at the equivalent of 10½ lb. to a gallon, and subsequently at 10½ lb.

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Most Societies reported reduced average yields, and only 13 were successful in obtaining increases. The largest increase was 467 lb. from 7,725 lb. (748 gallons) to 8,192 lb. (793 gallons) in Nottingham, while Denbigh, Hereford, Leicester and Peak (Derby) showed decreases exceeding 500 lb. The Derby and District Society obtained the highest average yield with 8,440 lb. (817 gallons), and Essex, Norfolk, Glamorgan and Nottingham each exceeded 8,000 lb. (774 gallons).

As regards individual herds, 16 had average yields of over 13,000 lb. (1,258 gallons) for full-year cows, as compared with 17 in 1930-31, while an average of over 10,000 lb. (968 gallons) was reached by 253 herds as against 257 in 1930-31. The number of herds with averages of over 8,000 lb. (774 gallons) per cow was 1,278, which compares with 1,420 in 1930-31. The following table contains a few examples of the increases that can be effected in the average yields of herds as a result of the elimination of low-yielding cows, and the greater attention to breeding, selection and feeding that normally follows the inclusion of milk-recording in the farm routine:—

Herd	No. of years during which records have been taken	Average yield per cow in first year	Average yield per cow in last year	Increase in annual average yield per cow	No. of full-year cows in last year of period	Cash value of increase of last year over first year at 1s. per gallon	
						Per cow	Per herd
		Gal.	Gal.	Gal.		£ s.	£ s.
A (Pedigree Friesian)	5	752	1,211	459	20	22 19	459 0
B (Non-Pedigree Shorthorn)	6	877	1,325	448	20	22 8	448 0
C (Pedigree Red Poll)	6	544	934	390	15	19 10	292 10
D (Non-Pedigree Lincoln Red)	8	691	935	244	20	12 4	244 0
E (Pedigree Jersey)	8	575	899	324	10	16 4	162 0

The number of cows that reached the standard yield of their breed was 17,241 as compared with 18,268 in 1930-31. The six highest yields were given by Friesians, the two

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highest being 26,906 lb. (2,604 gal.) and 25,205 lb. (2,439 gal.). The two cows concerned were owned by different members of the Norfolk Society. The number of cows that gave yields of 10,000 lb. or over was 10,423, as compared with 11,021 in 1930-31, while there were 41 cows that gave over 20,000 lb., as against 39 in the previous year. Some details of the breeds and the yields of cows that gave the standard yield are included in the following table:—

NUMBER OF COWS THAT GAVE THE STANDARD YIELD PRESCRIBED FOR THEIR BREED OR TYPE DURING THE YEAR ENDED OCTOBER 1, 1932, CLASSIFIED ACCORDING TO BREED AND YIELD.

Breed or type	Standard yield lb.	Yields (in lb.)								Total number of cows giving the standard yield
		8,000 to 9,000	9,000 to 10,000	10,000 to 11,000	11,000 to 12,000	12,000 to 14,000	14,000 to 16,000	16,000 to 20,000	Over 20,000	
Ayrshire ..	9,000	—	233	121	60	60	13	6	1	494
Blue Albion	9,000	—	38	29	18	12	5	—	—	102
Devon ..	8,000	51	20	7	1	2	1	—	—	82
Friesian ..	10,000	—	—	1,592	1,138	1,178	416	206	38	4,568
Guernsey ..	8,000	671	360	173	60	36	7	1	—	1,308
Jersey ..	8,000	305	168	68	38	16	2	—	—	597
Lincoln Red										
Shorthorn	9,000	—	136	74	45	27	7	2	—	291
Red Poll ..	9,000	—	335	209	114	73	16	1	—	748
Shorthorn ..	9,000	—	4,126	2,322	1,151	759	131	45	2	8,536
South Devon	8,000	148	78	51	29	17	4	1	—	328
Welsh Black	8,000	34	13	6	3	4	—	—	—	60
Other Breeds	8,000	*68	34	16	5	3	1	—	—	127
Totals ..	—	*1,277	5,541	4,668	2,662	2,187	603	262	41	17,241

* Includes 13 Dexter cows with yields of 7,000 to 8,000 lb. (standard yield for Dexters is 7,000 lb.).

The total number of cows and heifers of certain breeds recorded in England and Wales during the year ended October 1, 1932, and the number and average yield of the cows recorded for the full year, together with the percentage of full-year cows, are shown in the next table. The total number of cows and heifers recorded shows some increase for Ayrshires, Guernseys, Jerseys and South Devons, but this increase is more than outweighed by a considerable decrease in the number of Shorthorns, which fell from 82,296 to 79,118. Friesians remain practically unchanged, the figure for 1930-31 being 22,275, while the average yield

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for this breed is practically the same at 8,901 lb. as compared with 8,900 in 1930-31. Shorthorns, on the other hand, show a fall in average yield from 7,251 lb. in 1930-31 to 7,099 lb. in 1931-32.

Breed or type	Total number of cows and heifers recorded	Particulars of cows recorded for full year			
		Number	Percentage of total cows and heifers	Total yield	Average yield
				lb.	lb.
Ayrshire ...	5,581	1,682	46.9	12,628,095	7,507
Blue Albion...	649	378	58.2	2,866,673	7,583
Devon ...	1,062	613	57.7	3,604,132	5,879
Friesian ...	22,319	12,551	56.2	111,726,446	8,901
Guernsey ...	10,404	4,914	47.2	32,112,634	6,534
Jersey ...	5,740	2,773	48.3	17,561,556	6,333
Kerry ...	692	320	46.2	1,796,853	5,615
Lincoln Red	2,196	1,114	50.7	8,232,195	7,389
Red Poll ...	5,684	3,382	59.5	24,607,071	7,275
Shorthorn ...	79,118	40,786	51.5	289,555,437	7,099
South Devon	2,365	1,171	49.5	7,778,486	6,642
Welsh Black	910	498	54.7	2,775,790	5,573

Issue of Certificates.—The number of Certificates of Merit that have been issued in respect of the three years ended October 1, 1932, is 515, as compared with 465 for the previous three-year period. In addition, 38 certificates were issued during the past year for three-year periods earlier than that ended October 1, 1932. Certificates of Merit are only awarded, on application by the owners and on payment of a fee of 5s., for cows that have given during a three-year period the prescribed yield of milk for their breed or type and have been shown to be regular breeders. The number of members of Milk Recording Societies who obtained Certificates of Merit increased from 176 to 192. The number of Certificates issued in respect of Shorthorns was 186, a decrease of 11. The number issued for Red Polls was 105, an increase of 11, and there were also increases for Guernseys, Friesians and Jerseys. The highest yields in the three-year period certified for various breeds were a non-pedigree Friesian with 60,377 lb.; a non-pedigree Shorthorn with 57,597 lb.; a Red Poll with 48,641 lb.; an Ayrshire with 48,559 lb.; a Guernsey with 43,487 lb.; and a Jersey with 36,287 lb.

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Certificates of Milk Record in respect of the yield of one year only are still in little demand, and only 12 of these certificates were issued as against 16 in 1930-31.

Register of Dairy Cattle.—Volume XVI of the Register of Dairy Cattle was published in June, 1933, and contains particulars of the 553 cows for which Certificates of Merit had been issued since the publication of Volume XV in June, 1932, and also particulars of 30 pedigree dairy bulls. Of the bulls, 28 qualified for entry on the basis of the yields given by their dams and sires' dams, and two on the basis of the yields of two or more of their daughters.

Calf and Bull Marking.—The number of calves marked in 1931-32 under the Ministry's Scheme for the registration and marking of calves of milk-recorded cows was 14,379 as against 14,391 in the previous year. In view of the reduction in membership of the Societies this section of their activities must be regarded as satisfactory. As usual most of the calves marked were heifers, only 920 being bulls. The number of bulls being used for service by members of Milk Recording Societies, and marked under the Scheme, was 49, as compared with 43 in 1930-31.

Testing for Butter-Fat.—The number of samples taken by Recorders for testing for butter-fat was slightly smaller than in 1930-31; this is no doubt attributable to the reduction in the number of herds recorded. The actual number of samples taken was 154,407 as against 155,272 in 1930-31; over 126,500 of the samples had reference to individual cows. When it is recalled that there was an increase of 27,395 in the number of samples taken in 1930-31 over the previous year, it will be realized that interest in butter-fat testing is well maintained among the members of the Societies.

Rationing.—The benefits that occur from careful attention to rationing of milk-recorded cows are constantly being impressed on the members of the Milk Recording Societies, both by the Ministry's Live-Stock Officers and by the officials of the Societies. Advice on rationing is readily obtainable by members of the societies, from County Agricultural Organizers and other authoritative sources, and the feeding of balanced rations should be regarded by every farmer with a milk-recorded herd as an essential part of his farm economy.

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Cost of Milk Recording.—There was a small reduction in the average cost of milk recording per cow over the whole country. The average amount paid by members of the Societies was 4s. 2d. per cow, while the Ministry's grants averaged 2s. per cow, as compared with 4s. 3d. and 2s. 1d. respectively in 1930-31.

NOTE.—The following memoranda, which give detailed information concerning the Ministry's Live Stock Improvement Scheme, can be obtained (single copies free of charge) on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1:—

Form No. A 763/T.L. Scheme for the Improvement of Live Stock.

Form No. 609/T.L. Bull Grant Regulations.

Form No. 466/T.L. Boar Grant Regulations.

Form No. 89/T.L. Heavy Horse Regulations.

Form No. 392/T.L. Milk Recording Regulations.

MILK RECORDING SOCIETIES.

STATEMENT GIVING PARTICULARS OF THE 49 MILK RECORDING SOCIETIES.
OPERATING DURING THE YEAR ENDED OCTOBER 1, 1932.

(The Societies are arranged in order of total number of cows recorded.)

Society	*No. of Mem- bers	*No. of herds	Total No. of cows re- corded	No. of cows recorded for full year	Average yield of cows recorded for full year
					lb.
Essex County - - -	187	221	9,006	4,562	8,125
Suffolk - - -	278	317	8,688	4,920	7,917
Hampshire - - -	179	212	7,257	3,843	6,894
East Sussex - - -	210	239	6,896	3,823	7,029
Berkshire - - -	161	191	6,527	3,517	7,211
Somerset and North Dorset - - -	176	205	6,427	3,616	6,955
Norfolk - - -	210	226	6,337	3,875	8,211
Hertfordshire County - - -	159	180	5,316	3,014	7,578
North Wilts. - - -	85	100	4,307	2,359	6,773
Kent - - -	130	147	4,228	2,201	7,119
West Sussex - - -	120	132	4,199	2,016	7,585
Surrey - - -	133	142	4,003	1,999	7,037
Lancashire County - - -	120	127	3,797	1,343	7,476
Gloucestershire - - -	102	109	3,338	1,841	6,851
Oxfordshire - - -	93	101	3,309	1,744	7,255
Dorset - - -	50	75	3,279	1,958	6,670
Shropshire - - -	70	71	2,814	1,453	7,126
Warwickshire - - -	104	109	2,693	1,342	7,497
Yorkshire - - -	101	104	2,678	1,038	7,837
Leicestershire and Rutland - - -	91	97	2,647	1,296	7,000
Buckinghamshire - - -	93	101	2,612	1,286	7,360
South Devon and District - - -	102	106	2,426	1,204	6,593
Cambridgeshire and District - - -	73	82	2,118	1,062	7,739

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Society	*No. of Mem- bers	*No. of herds	Total No. of cows re- corded	No. of cows recorded for full year	Average yield of cows recorded for full year lb.
Staffordshire - -	62	63	2,111	1,002	7,790
South Wilts. - -	31	43	2,029	1,251	7,254
Cheshire County - -	50	55	1,892	896	7,217
Northamptonshire - -	65	71	1,858	833	7,058
Bristol and North Somerset - -	71	76	1,845	1,000	7,124
Worcestershire - -	73	74	1,744	893	7,244
Cumberland and N. Westmorland - -	86	87	1,739	771	6,156
Bedfordshire - -	52	54	1,616	797	7,991
Nottinghamshire - -	46	48	1,562	657	8,192
Derby and District - -	48	49	1,497	694	8,440
Lincolnshire - -	44	47	1,420	732	7,441
Northumberland - -	50	52	1,255	602	7,628
Peak (Derby) - -	48	49	1,212	521	6,982
Durham County - -	44	46	1,168	535	7,411
East Devon - -	61	61	1,067	597	6,509
Cornwall - -	52	53	907	515	6,640
Monmouthshire and Brecon - -	40	40	879	399	7,557
Denbighshire and Flintshire - -	39	39	864	454	6,756
Herefordshire - -	35	35	715	455	7,564
Anglesey and Caernarvonshire - -	49	50	713	378	5,451
Kendal and South Westmorland - -	36	36	697	294	5,492
Campden, Moreton and Dist. (Glos) - -	28	28	681	362	6,842
Glamorganshire - -	31	31	527	292	8,363
Carmarthenshire - -	15	16	395	237	6,697
Cardiganshire - -	26	27	527	185	6,011
Pembrokeshire - -	18	18	290	182	7,142
TOTALS -	4,227	4,642	135,912	70,826	7,330

*Herds of Goats are not included.

AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1933

ACREAGE UNDER CROPS AND GRASS AND NUMBERS OF LIVE STOCK ON
HOLDINGS ABOVE ONE ACRE IN EXTENT IN ENGLAND AND
WALES AS RETURNED BY OCCUPIERS ON JUNE 3, 1933.

(The figures for 1933 are subject to revision.)

Crops and Grass

Distribution	1933	1932	Increase		Decrease	
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Per cent.</i>	<i>Acres</i>	<i>Per cent.</i>
TOTAL ACREAGE under all CROPS and GRASS ...	25,112,000	25,206,000	—	—	94,000	0·4
*ROUGH GRAZINGS ...	5,396,000	5,357,000	39,000	0·7	—	—
ARABLE LAND ...	9,246,000	9,367,000	—	—	121,000	1·3
PERMANENT GRASS :						
For Hay ...	4,602,000	4,842,000	60,000	1·3	—	—
Not for Hay ...	11,264,000	11,297,000	—	—	33,000	0·3
TOTAL ...	15,866,000	15,839,000	27,000	0·2	—	—
Wheat ...	1,660,000	1,288,000	372,000	28·9	—	—
Barley ...	751,000	961,000	—	—	210,000	21·9
Oats ...	1,494,000	1,580,000	—	—	86,000	5·4
Mixed Corn ...	104,800	114,400	—	—	9,600	8·4
Rye ...	19,900	24,600	—	—	4,700	19·1
Beans, harvested as corn...	139,600	138,600	1,000	0·7	—	—
Beans, picked or cut green ...	13,700	15,000	—	—	1,300	8·7
Peas, harvested as corn...	72,800	65,800	7,000	10·6	—	—
Peas, picked or cut green ...	63,500	60,500	3,000	5·0	—	—
Potatoes...	518,300	504,300	14,000	2·8	—	—
Turnips & Swedes	555,300	580,500	—	—	25,200	4·3
Mangold ...	238,000	229,700	8,300	3·6	—	—
Sugar-Beet ...	363,900	255,000	108,900	42·7	—	—
Cabbage for fodder, Kohl-rabi and Rape ...	117,400	109,400	8,000	7·3	—	—
Vetches or Tares	53,300	48,600	4,700	9·7	—	—
Lucerne...	33,600	39,400	—	—	5,800	14·7
Mustard for seed	16,300	20,000	—	—	3,700	18·5
Cabbage for human consumption ...	33,100	33,900	—	—	800	4·2
Brussels Sprouts	35,900	33,000	2,900	8·8	—	—

* Mountain, Heath, Moor, Down and other rough land used for grazing.

AGRICULTURAL RETURNS, 1933

CROPS AND GRASS—continued.

Distribution	1933	1932	Increase		Decrease	
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Per cent.</i>	<i>Acres</i>	<i>Per cent.</i>
Cauliflower or Broccoli ...	20,700	17,700	3,000	16·9	—	—
Carrots ...	14,100	12,500	1,600	12·8	—	—
Onions ...	2,000	1,900	100	5·3	—	—
Celery ...	7,500	7,700	—	—	400	5·2
Rhubarb ...	8,500	8,300	—	—	—	—
Linseed ...	1,100	1,300	—	—	200	15·4
Hops ...	16,900	16,500	400	2·4	—	—
Small Fruit ...	59,800	59,500	300	0·5	—	—
Orchards ...	249,400	247,300	2,100	0·8	—	—
CLOVER & ROTATION GRASSES:						
For Hay ...	1,261,000	1,538,000	—	—	277,000	18·0
Not for Hay ...	815,000	873,000	—	—	60,000	6·9
TOTAL ...	2,074,000	2,411,000	—	—	337,000	14·0
BARE FALLOW ...	457,000	434,000	23,000	5·3	—	—

The returns, made by occupiers of agricultural holdings exceeding one acre in England and Wales, showed that the total agricultural area, on June 3, 1933, was 30,508,000 acres, as compared with 30,563,000 acres in 1932—a net reduction amounting to 55,000 acres. The area under crops and grass was 25,112,000 acres, or 94,000 acres less than in 1932. The area under rough grazings at 5,396,000 acres, showed an increase of 39,000 acres. The arable acreage was 9,246,000, or 121,000 acres less than last year, the reduction being roughly one-half that shown in the two preceding years. Of the arable area, 457,000 acres were returned as bare fallow, which is 23,000 acres more than in 1932. The area actually under crops (excluding clover and rotation grasses) was 6,715,000 acres, or 193,000 acres more than in 1932. There was an increase of 27,000 acres in the area under permanent grass, which was returned this year at 15,866,000 acres.

The total corn area, which in 1932 showed a reduction of about 75,000 acres, recovered to the extent of 70,000 acres this year. This recovery is due entirely to an increase of 28·9 per cent. in the wheat acreage; the area under barley has contracted by 21·9 per cent.; that under oats by 5·4 per cent.; and that under mixed corn by 8·4 per cent. The potato acreage showed a small increase of 2·8 per cent. The area under sugar beet increased by 42·7 per cent. The acreage under roots, on the whole, showed a reduction, an increase in mangolds being more than counterbalanced by the decrease in the acreage under turnips and swedes. The acreage under other fodder crops slightly increased. Most vegetables show an increased acreage. The acreage under fruit and hops shows a small increase.

Cereals.—The wheat acreage increased by 372,000 acres (28·9 per cent.) to 1,660,000 acres. The increase was general throughout the country. The North-Eastern and Eastern divisions, which contain

AGRICULTURAL RETURNS, 1933

the main wheat-growing areas, show a combined increase of about 185,000 acres. There was an addition of 43,000 acres in the East Midland division, and of 35,000 acres in the Northern division.

The barley area, which showed a reduction of 69,000 acres in 1932, declined further this year by 210,000 acres to 751,000 acres. Except for negligible increases in the North-Western division and in North Wales, the decline in acreage was general. Two-thirds of the total decrease occurred in the Eastern and North-Eastern divisions.

Last year's acreage under oats, which was the smallest so far recorded, was further decreased this year by 86,000 acres to 1,494,000 acres. There was, however, an increase of 1,700 acres in Cornwall, and smaller increases in most of the Welsh counties, but otherwise the decrease in acreage was very general. The decrease amounted to 19,000 acres in the North-Eastern division, to 14,000 acres in the Northern division, whilst the South-Eastern, North-Western and East Midland divisions each returned a decrease of over 10,000 acres.

Mixed corn was grown on an area of 104,800 acres, or 9,600 acres less than in 1932. Except in Wales, where the area under this crop increased, there were reductions in all divisions.

The acreage under rye was 19,900 acres—a decrease of 4,700 acres (19·1 per cent.) on 1932. This was the lowest acreage recorded for this crop.

Beans and Peas.—The total area under beans, which was 153,300 acres, shows a slight reduction of 300 acres on that of 1932. The reduction was due to a loss of 1,300 acres in the area cut green, which more than balanced the increase of 1,000 acres in the area harvested as corn. The greatest changes in the acreage under beans occurred in the Eastern division, where there was a net increase of 5,600 acres. There was a decrease of 2,300 acres in the North-Eastern division, and smaller decreases in the remaining divisions except North Wales. The total area under peas, at 136,300 acres, was 10,000 acres more than in 1932. The area to be harvested as corn showed an increase of 7,000 acres, and that picked green of 3,000 acres. The total area under peas in the North-Eastern division increased by about 10,000 acres, but the very general increase in the area picked green was about counterbalanced by decreases in the area harvested for corn in the remaining divisions.

Potatoes.—For the third year in succession the acreage under potatoes has shown an increase. The area under this crop this year was 518,300 acres, or 14,000 acres (2·8 per cent.) more than in 1932, the increase being rather less than that recorded in the two preceding years. Most of the additional acreage was returned in the Northern division, which showed an increase of nearly 7,000 acres, and in the Eastern and North-Eastern division, in each of which the addition amounted to about 3,000 acres. There was also an addition of 1,400 acres in the South-Eastern division, but a decrease of like extent in the South-Western division.

Sugar-Beet.—The sugar-beet acreage, which last year showed some recovery from the heavy reduction recorded in 1931, increased considerably this year. The total acreage returned was 363,900 acres, which is about 17,000 acres higher than the previous peak year of 1930. This year's acreage represents an increase of 108,900 acres, or 42·7 per cent. Practically every county contributed to the additional acreage, but the main additions were in the North-Eastern division, with 53,000 acres, and in the Eastern division with 36,000 acres more than in 1932. In Norfolk alone the increase was 36,000 acres, and in Suffolk the increase was 18,000 acres.

Fodder Roots.—The area under turnips and swedes was again reduced, the total of 555,300 acres being 25,200 acres (4·3 per cent.)

AGRICULTURAL RETURNS, 1933

less than in 1932. Small increases were shown in a few counties, principally in the Midland division and in Cambridge and Cumberland, but otherwise the decline in acreage was general. The North-Eastern division shows a reduction of 11,000 acres. The area under mangolds was 238,000 acres, or 8,300 acres (3·6 per cent.) more than in 1932. The increase was very general except in the Eastern and North-Eastern divisions, the mangold area of the latter being reduced by 1,600 acres.

Vegetables.—There was a slight further reduction in the acreage of cabbage, but the acreage under other vegetables for which returns were collected, except celery and rhubarb, showed appreciable increases. Cauliflower and broccoli increased by 3,000 acres (16·9 per cent.), and brussels sprouts by 2,900 acres (8·8 per cent.). The acreage under carrots increased by 1,600 acres, and that under onions by 100 acres. Celery showed a reduction of 400 acres, and the acreage under rhubarb was unchanged at 8,300 acres.

Other Crops.—The area under fodder cabbage, kohl-rabi and rape was 117,400 acres, an increase of 8,000 acres on that of 1932. Vetches and tares also showed an increase of 4,700 acres, the area returned being 53,300 acres. The area under lucerne declined further by 5,800 acres to 33,600 acres, and there was a further decline in mustard for seed of 3,700 acres and in linseed of 200 acres.

The hop acreage showed little change: the area returned at 16,900 acres was 400 acres more than in 1932.

Fruit.—The total fruit acreage, which showed a very slight rise in 1932, shows a further increase this year, due mainly to an addition of 2,100 acres to the acreage under orchards; the area under small fruit shows an increase of only 300 acres as compared with a reduction of 2,500 acres in 1932. The increase in orchards was mainly in Kent, with an addition of 1,300 acres, and in Gloucester, Worcester and Essex, which returned additions of 700 acres, 530 acres and 660 acres respectively. The greatest increase in the small fruit area was also shown in Kent, where an addition of 1,100 acres was returned, and in Essex with an addition of 200 acres.

Clover and Rotation Grasses and Meadow Hay.—The total area under clover and rotation grasses shows a substantial reduction amounting to 14 per cent. as compared with 1932. The total area returned was 2,074,000 acres, of which 1,261,000 acres were intended for hay. This latter figure shows a loss of 277,000 acres (18 per cent.) while the area not intended for mowing, viz., 813,000 acres, shows a reduction of 60,000 acres (6·9 per cent.) as compared with 1932. The area under meadow hay was 4,602,000 acres, or 60,000 acres more than last year, and the total area under hay this year is thus 217,000 acres less than in 1932.

Bare Fallow.—Land returned as bare fallow amounts to 457,000 acres, showing an increase of 23,000 (5·3 per cent.) as compared with 1932.

Live Stock

With the exception of cattle, which show an increase of 4·1 per cent., the numbers of live stock returned are smaller this year than in 1932. Sheep have declined in numbers by 2·2 per cent., pigs by 3·8 per cent., and horses by 1·6 per cent.

AGRICULTURAL RETURNS, 1933

CATTLE.

	1933	1932	Increase		Decrease	
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>Per cent.</i>	<i>No.</i>	<i>Per cent.</i>
Cows and Heifers in milk ...	2,179,600	2,116,600	63,000	3.0	—	—
Cows in calf, but not in milk ...	358,000	352,000	6,000	1.7	—	—
Heifers in calf...	418,000	402,800	15,200	3.8	—	—
Other Cattle:—						
Two years and above ...	997,400	938,900	58,500	6.2	—	—
One year and under two ...	1,356,800	1,241,800	115,000	9.3	—	—
Under one year	1,312,000	1,305,900	6,100	0.5	—	—
TOTAL OF CATTLE	6,621,800	6,358,000	263,800	4.8	—	—

The total number of cattle in the country has increased annually since 1930, and at 6,621,800 the total this year is the highest on record. The dairy herd, also, is larger than in any previous year for which figures are available; the net increase during the year is 84,200. Cows and heifers in milk have increased by 63,000, or 3.0 per cent.; cows in calf by 6,000, or 1.7 per cent.; and heifers in calf by 15,200, or 3.8 per cent. In England the increase in the dairy herd is general, but in Wales five counties returned numbers slightly below those returned in 1932. Increases in the dairy herd in the various divisions range from 1.2 per cent. in the two Welsh Divisions to 6.7 per cent. in the South-Eastern Division.

There is also an increase in the numbers of "other cattle": those two years old and above have increased by 58,500, or 6.2 per cent.; those over one year but under two years by 115,000, or 9.3 per cent.; and those under one year old by 6,100, or 0.5 per cent. The numbers of "other cattle" over one year old show a general increase throughout the country, but those under one year have declined in numbers in a few counties in England and in every county in Wales.

SHEEP.

	1933	1932	Increase		Decrease	
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>Per cent.</i>	<i>No.</i>	<i>Per cent.</i>
Ewes kept for breeding ...	7,765,300	7,634,300	129,000	1.7	—	—
Other Sheep:—						
One year and above ...	2,435,700	2,953,400	—	—	517,700	17.5
Under one year	7,886,300	7,907,700	—	—	21,400	0.3
TOTAL OF SHEEP	18,085,300	18,495,400	—	—	410,100	2.2

The total number of sheep in the country is smaller by 410,100, or 2.2 per cent., than in 1932. There is, however, an increase of 129,000,

AGRICULTURAL RETURNS, 1933

equivalent to 1·7 per cent. in the number of breeding ewes, which has raised the total to 7,763,300, the highest total since 1909. With the exception of the North-Eastern division, where a reduction in the numbers of breeding ewes, amounting to 2·1 per cent. has occurred, the increases are general, and range from 0·4 per cent. in the Northern division to 4·5 per cent. in the East Midland division. In Wales the increase is approximately 1 per cent. "Other sheep" show a decrease in numbers, which is much more marked in those one year old and above than in the case of those under one year.

PIGS.

	1933	1932	Increase		Decrease	
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>Per cent.</i>	<i>No.</i>	<i>Per cent.</i>
Sows kept for breeding ...	404,600	425,200	—	—	20,600	4·8
Other Pigs ...	2,659,800	2,759,400	—	—	99,600	3·6
TOTAL OF PIGS	3,064,400	3,184,600	—	—	120,200	3·8

The number of pigs in the country is smaller than in 1932. Sows have decreased by 20,600, or 4·8 per cent., and "other pigs" by 99,600, or 3·6 per cent. The total decline amounts to 120,200, or 3·8 per cent. With the exception of the Eastern division, where there is an increase in the number of sows amounting to 1·4 per cent., the number of sows has declined generally throughout the country; the decreases range from 2·4 per cent. in the Northern division to 11·7 per cent. in South Wales. In the case of "other pigs" the decrease has not occurred in every county, and in the Eastern and South-Eastern divisions there are net increases amounting to 6·4 per cent. and 1·5 per cent. respectively. In the other divisions of the country decreases are reported ranging from 0·1 per cent. in the East Midland division to 14·1 per cent. in South Wales.

HORSES.

	1933	1932	Increase		Decrease	
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>Per cent.</i>	<i>No.</i>	<i>Per cent.</i>
Horses used for Agricultural purposes (including Mares for breeding) ...	645,400	655,100	—	—	9,700	1·5
Unbroken Horses (including Stallions):						
One year and above ...	84,900	83,600	1,300	1·6	—	—
Under one year ...	41,200	39,100	2,100	5·4	—	—
Other Horses ...	130,800	139,300	—	—	8,500	6·1
TOTAL OF HORSES	902,300	917,100	—	—	14,800	1·6

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Although the total number of horses in the country has continued to decline the rate of decrease is diminishing, and the decrease this year amounts to only 14,800, or 1·6 per cent., as compared with a decrease of 21,400, or 2 per cent., last year. Horses used for agricultural purposes (including mares kept for breeding) have declined in numbers by 9,700, or 1·5 per cent., as against a decrease of 11,400, or 2 per cent. in 1932. The most important feature, however, is the continued increase in the number of foals, which at 2,100, or 5·4 per cent., is greater than last year, when the increase amounted to 1,300, or 3 per cent. The increase has occurred in the numbers of foals from heavy horses: foals from the lighter breeds show a small decline.

Agricultural Workers

	1933	1932	Increase		Decrease	
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>Per cent.</i>	<i>No.</i>	<i>Per cent.</i>
Regular Male Workers:						
21 years old and over ...	422,300	419,700	2,600	0·6	—	—
Under 21 years old ...	113,500	115,700	—	—	2,200	1·9
TOTAL ...	535,800	535,400	400	0·1	—	—
Casual Male Workers:						
21 years old and over ...	78,400	64,700	13,700	21·2	—	—
Under 21 years old ...	10,900	9,500	1,600	17·2	—	—
TOTAL ...	89,300	74,000	15,300	20·7	—	—
TOTAL MALE WORKERS REGULAR & CASUAL	625,100	609,400	15,700	2·6	—	—
Women & Girls:						
Regular workers	59,600	62,300	—	—	2,700	4·3
Casual workers	30,400	25,800	4,600	17·8	—	—
TOTAL ...	90,000	88,100	1,900	2·2	—	—
TOTAL WORKERS, ALL CLASSES ...	715,100	697,500	17,600	2·5	—	—

For the first time since 1924, the total number of agricultural workers in the country shows an increase. This increase has occurred mainly in the number of casual workers returned as working on June 3 this year. The increase in casual male workers amounts to 15,300, or 20·7 per cent., and in casual female workers to 4,600, or 17·8 per cent. The number of regular male workers 21 years old and over shows a small increase of 2,600, or 0·6 per cent., but the number of regular male workers under 21 years of age shows a decline of 2,200, or 1·9 per cent. The number of women and girls in regular work on agricultural holdings has fallen by 2,700, or 4·3 per cent.

AGRICULTURAL RETURNS, 1933

Hops

Acreage of Hops.—Preliminary Statement compiled from the Returns collected on June 3, 1933, showing the Acreage under Hops in each county of England in which Hops were grown, with a Comparative Statement for the Years 1932 and 1931.

Counties, etc.				1933	1932	1931
				Acres	Acres	Acres
Kent ...	{	East ...	...	2,000	1,921	2,556
		Mid ...	...	2,630	2,549	3,550
		Weald ...	...	4,710	4,507	5,388
	Total, Kent ...			9,340	8,977	11,494
Hants	...	...	...	540	520	751
Hereford	...	...	...	3,800	3,864	3,817
Surrey	...	...	...	90	83	146
Sussex	...	...	...	1,190	1,195	1,453
Worcester	...	...	...	1,830	1,828	1,811
Other Counties	...	...	...	60	64	56
TOTAL ...				16,850	16,531*	19,528*

* These figures include the acreage left unpicked, which was estimated in 1932 to be about 200 acres and in 1931 about 1,600 acres.

MARKETING NOTES

Regulation of Supplies of Bacon and Hams.—(a) *General.*—The plan recommended by the Lane-Fox Commission for the stabilization of United Kingdom bacon supplies envisaged the fixation of the total annual quantity from all sources at a level representing normal consumption, as far as that can be ascertained. The measure of normal consumption that the Commission suggested was the supply during the 6-year period 1925-30. The Lane-Fox plan further proposed (1) the fixation of home output at the figure represented by contracts for the sale of pigs between producers and curers, and (2), after allowing for Dominion supplies, the distribution of the balance of the total figure between foreign exporting countries.

The Government has accepted, in principle, the policy recommended by the Lane-Fox Commission and, pending the organization of home producers and curers under the Agricultural Marketing Acts, which is necessary to enable home supplies to be regulated, imports of bacon from foreign sources have been gradually reduced under a “gentleman’s agreement” with the main exporting countries.

(b) *Home Supplies.*—The marketing schemes for pigs and bacon, which were submitted by producers and curers early this year, have secured favourable majorities at the recent polls of producers, and will come into full operation on September 10. Owing, however, to the large amount of administrative work involved, it is not expected that the sale of pigs on contract will commence until November 1. If the Lane-Fox plan had been rigidly adhered to, this would have involved the postponement of the full measure of import regulation until that date, but an arrangement has been made under which the Minister has consented to accept an arbitrary estimate of home output for the period September 15 to October 31 and to arrange for a reduction of imports on September 15 to an extent sufficient to bring total supplies, on the basis of this estimate, to approximately the level recommended by the Lane-Fox Commission.

The estimate that has been accepted in respect of the United Kingdom output during this period is 40,000 cwt. per week, and, in the event of the actual figure, as certified

MARKETING NOTES

by the Bacon Board, to the satisfaction of the Minister, exceeding 40,000 cwt. per week, the excess up to a maximum of 20,000 cwt. per week will be added to the output during the first contract period and imports will be correspondingly reduced.

The Pigs and Bacon Marketing Boards have in their turn agreed that, as from September 15, the former Board will prescribe, and curers will pay for all bacon pigs bought by them, the prices agreed as the contract prices for bacon pigs. This means that pigs between 7 score and 8 score 10 lb. dressed carcass weight will, at the present price of feeding-stuffs, realize 12s. per score. Agreed deductions from the price per score will be made for pigs of heavier weights.

On November 1, there will commence a preliminary contract period, which will extend to February 28 next. During that period, the home industry's share of the market will be measured by the number of pigs contracted to be sold by producers to curers. Subsequently, the aim will be to fix supplies for 12 months at a time.

(c) *Imports from Foreign Sources.*—Particulars have been given in this JOURNAL from time to time of the quantities of bacon and hams to which the foreign countries concerned have agreed, as far as practicable, to limit shipments to the United Kingdom under the "gentleman's agreement" referred to above. The following are the monthly quantities agreed in respect of the period from June 23 until the commencement of the permanent arrangements for the regulation of all supplies on the lines recommended by the Lane-Fox Commission.

	<i>June 23—July 22.</i>	<i>July 23 onwards.</i>
	Cwt.	Cwt.
Denmark	462,100	438,900
Netherlands	74,500	72,600
Poland	72,700(a)	70,900(a)
Lithuania	35,100	34,200
Sweden	33,800(c)	32,900(c)
Estonia	6,300(d)	6,200(d)
Finland	3,900(d)	3,800(d)
Latvia	3,500(d)	3,400(d)
U.S.S.R.	3,500	3,400
Argentina	5,400	5,200
U.S.A.	62,000(b)	62,000(b)

(a) Including special ham allocations of 2,500 cwt. per month.

(b) Including special ham allocations of 26,900 cwt. and 27,800 cwt., respectively, and subject to a further price contingent not exceeding 15 per cent.

(c) Subject to tolerances of 2,750 cwt. and 2,500 cwt., respectively, in view of previous short shipments.

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(d) Subject to the following seasonal deductions:—

Estonia	..	2,000 cwt. per month.
Finland	}	250 cwt. for June 23-July 22; 300 cwt. per
Latvia		month thereafter.

The following statement shows, in respect of each exporting country participating in the "gentleman's agreement," the quantity of bacon and hams imported into the United Kingdom in the period December, 1931, to July, 1932, inclusive, the total allocations for the period November 23, 1932, to July 22, 1933, inclusive, and the quantity actually imported into the United Kingdom in the period November 23, 1932, to July 18, 1933, inclusive:—

<i>Country.</i>	<i>Imports into U.K. December, 1931, to July, 1932.</i>	<i>Allocations. November 23, 1932, to July 22, 1933.</i>	<i>Imports into U.K. November 23, 1932, to July 18, 1933.</i>
	cwt.	cwt.	cwt.
Denmark	.. 5,306,013	3,885,900	3,893,896
Netherlands	.. 429,836	637,300	625,192
Poland	.. 846,695	618,700	624,157
Lithuania	.. 381,478	320,100	310,961
Sweden	.. 285,863	294,300	267,312
Estonia	.. 58,936	54,900	46,617
Finland	.. 25,817	33,450	27,327
Latvia	.. 6,132	30,550	30,496
U.S.S.R.	.. 44,001	29,500	26,849
Argentina	.. 57,384	46,440	49,629
U.S.A.	.. 378,508	382,000	387,813
Totals	.. <u>7,820,663</u>	<u>6,333,140</u>	<u>6,290,249</u>

It will be seen that the total imports in the period November 23, 1932, to July 18, 1933, from the countries concerned correspond very closely to the total allocations for the eight months to July 22, and that the operation of the agreement has in that period resulted in a total reduction of over 1,500,000 cwt., or nearly 20 per cent., in imports of bacon and hams as compared with the corresponding period of December, 1931, to July, 1932.

Proposals regarding the basis of allocation of total permitted foreign imports after September 15 are now under discussion with the Governments of the foreign countries concerned. It is hoped that it will be found possible to continue to regulate supplies by voluntary agreement.

Agricultural Marketing Act, 1933.—This measure, which received the Royal Assent on July 18, 1933, confers wide powers with regard to the regulation of imports of agricultural products and sales of home-produced agricul-

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tural products, and also provides for the submission and approval of development schemes for organizing the production of secondary agricultural products. It contains a number of amendments to the Agricultural Marketing Act, 1931, as well as miscellaneous and supplementary provisions.

The Act* establishes two important principles, viz., the regulation of supplies in order to make effective the organization of marketing at home, and the organization of the production of a manufactured product under a development scheme to be administered jointly by the marketing boards set up to organize the marketing of the manufactured product concerned and the primary product from which it is derived. The Act deals with the machinery for putting these principles into practice and for protecting the various interests that may be affected. Of special interest is the provision for the appointment of a body known as the Market Supply Committee, consisting of not more than five persons, whose duty it will be to review generally the circumstances affecting the supply of agricultural products and to make recommendations to the Ministers concerned as to any steps that should be taken for regulating that supply. The Committee will also advise and assist the Ministers concerned in the discharge of their functions in connexion with supply-regulation and will report to them on the operation of any Order made in that regard and of any arrangements for controlling the importation of any agricultural commodity.

The amendments that were made to the Bill during its passage through Parliament were of a minor character and do not affect the general description of the measure as given at p. 63 of the April, 1933, number of this JOURNAL, which is followed by a full report of the Minister's speech in moving the second reading of the Bill in the House of Commons.

Market Supply Committee : Appointment of Chairman.—The Marquess of Linlithgow, K.T., G.C.I.E., O.B.E., has consented to serve as Chairman of the Market Supply Committee, the appointment of which is provided for in the Agricultural Marketing Act, 1933 (see previous note).

* Copies of the Act may be obtained (price 9d. net, postage extra) from any of the sales offices of H.M. Stationery Office, or through any bookseller.

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Lord Linlithgow is at present presiding over the Joint Select Committee on Indian Constitutional Reform, and at his request his service as Chairman of the Market Supply Committee will be in an honorary capacity for the time being.

Lord Linlithgow was Chairman of the Committee on the Distribution and Prices of Agricultural Produce (1922-24), and of the Royal Commission on Indian Agriculture (1926-28). He is also Chairman of the Meat Advisory Committee of the Board of Trade.

Agricultural Marketing Act (Northern Ireland) 1933.—This Statute follows very closely, and includes within its scope, the main principles embodied in the 1931 and 1933 Acts passed by the United Kingdom Parliament, and has the effect of bringing Northern Ireland into line with Great Britain in relation to agricultural marketing legislation.

Although the Northern Ireland Act constitutes a counterpart to the legislation in Great Britain, and thus secures an essential measure of uniformity within the United Kingdom, the procedure differs in several interesting particulars. The differences in procedure are in the main due to the difficulties inherent in any attempt to organize agricultural marketing in a community of small family farms. Some conception of the difficulties may be formed from the fact that while the six counties that constitute Northern Ireland have an area about the size of Yorkshire, they contain approximately 30 per cent. more agricultural holdings than there are in the whole of Scotland, and 80 per cent. of the farms are 30 acres or less.

The Northern Ireland Marketing Act in effect constitutes the Ministry of Agriculture for Northern Ireland a permanent Reorganization Commission, and charges it with the duty of preparing and submitting for the approval of the interests concerned, schemes for regulating the sales of an agricultural product produced in Northern Ireland. Whilst the Ministry has discretion as to the preparation of a scheme where an Order has not been made under Part I of the United Kingdom Act, regulating the sales of that product, it is made mandatory on the Ministry to prepare a scheme whenever such is necessary for subserving any purposes of an Order regulating sales of an agricultural product made under Part I of the United Kingdom Act. In practice, whenever an agricultural marketing scheme is

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in force in Great Britain in respect of an agricultural commodity that is also produced in Northern Ireland, there will be a complementary scheme in operation in Northern Ireland.

Whilst the power of preparing marketing schemes is vested in the Northern Ireland Ministry, the interests of the producer are protected by the proviso that in preparing a scheme the Department must consult representatives of the producers and all other interests concerned. In practice, this means that when the Department has prepared a scheme, it is submitted to the Ulster Farmers' Union, the Agricultural Organization Society, and the County Committees of Agriculture for their consideration. The producer is further protected by the provision that, before he issues an order bringing a marketing scheme into operation, the Minister must give a fortnight's notice to enable objections to be lodged. If any objections other than frivolous ones are lodged, the Minister must order an inquiry, and await the report of the Commissioner appointed to hear the objections. In Northern Ireland it is not necessary to submit a scheme to a poll of the registered producers, and it is of interest to record that the omission of this feature from the Northern Ireland Act had the unanimous support of all producers' organizations.

Two further features of the Northern Ireland Act are of interest. The Act confers upon the Minister the power (1) to nominate three members on any marketing board that may be set up under the Act; and (2) to appoint the chairman, who shall hold office for at least two years. Thereafter, the election of chairman is vested in the board. The provision giving the Minister power to nominate the first chairman of boards was inserted in the Act at the request of representative producers' organizations. In order that rapid action can be taken if the necessity arises, the Minister is empowered to nominate the first board constituted under any scheme, but boards so nominated can only hold office for a period not exceeding one year, when they are superseded by a board elected by a direct vote of the registered producers.

Irish Free State: Interim Report of Pig Industries Tribunal.—In accordance with a resolution adopted by the Dail, the Government of the Irish Free State, in May last, appointed a tribunal of four persons to inquire into, and

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make recommendations to the Minister for Agriculture upon various matters connected with the pig and bacon-curing industries, including "the manner in which the exports of live pigs, bacon and pork should be controlled in view of the measures which have been or may be adopted for regulating quantitatively supplies of these commodities on external markets." An interim report by the tribunal (known as the Pig Industries Tribunal), dealing specially with this particular matter in relation to the United Kingdom market has now been issued. The report contemplates the allocation to the Irish Free State of a quota of imports into the United Kingdom, of bacon and live pigs or carcasses intended for conversion into bacon. Recommendations are made with regard to the administrative machinery necessary for the purpose of distributing from time to time the total quota allotted (a) as between bacon on the one hand and live pigs or carcasses intended for conversion into bacon on the other hand, and (b) amongst the individual exporters of these commodities. The Tribunal suggests that the Minister for Agriculture should have power to make the necessary sub-allocations of the total quota allotted, and that exporters of bacon, and of live pigs, should be registered, a condition precedent to registration being the export of a minimum quantity within the 12 months ended December 31, 1932. The individual exports during this period would be the basis of the sub-allocations. It is also suggested that, for the purpose of advising the Minister, consultative councils should be set up representing (1) bacon exporters and exporters of carcasses for conversion into bacon, and (2) exporters of live pigs; and that the Minister should have power to re-allocate sub-quotas from time to time in the event of individual exporters failing to utilize their sub-quota in full or within some reasonable tolerance. The Tribunal emphasizes that its recommendations cover the minimum administrative measures necessary to meet the immediate situation, and that more complete legislation may have to be provided at a later date in the light of experience.

Following the issue of the Tribunal's report, the Irish Free State Minister for Agriculture has introduced a Bill, the Agricultural Products (Regulation of Export) Bill, 1933, for regulating and controlling the export of agricultural products to any country that establishes a system of restriction or control of the import of such agricultural

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products. The recommendations of the Tribunal are, in effect, incorporated in the Bill, which also empowers the Minister for Agriculture, in connexion with any export order under the Bill, to purchase, sell and export to the country concerned such quantities of the regulated product as he thinks fit. The Bill has now passed into law.

Pigs Marketing Scheme.—The result of the poll on the question whether the Pigs Marketing Scheme should remain in force was declared on August 9; 99·539 per cent. of the registered producers voting (representing 99·299 per cent. of voters' productive capacity) declared in favour of the scheme. The necessary majority having been obtained, the scheme will come into full operation on September 9.

The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have appointed the following to be their nominees on the Pigs Marketing Board:—

The Earl of Radnor (Chairman of the Pig Industry Council).
Major Cecil Higgins, O.B.E., M.C. (Member of the Hops Marketing Board).

Bacon Marketing Scheme.—The result of the poll on the Bacon Marketing Scheme was also declared on August 9. Of the registered producers voting, 69 per cent., representing 92 per cent. of productive capacity of the producers voting, declared in favour of the scheme, which will therefore come into full operation on September 9.

The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have appointed the following to be their nominees on the Bacon Marketing Board:—

The Hon. Jasper Ridley (Chairman of the Ocean Accident and Guarantee Corporation; formerly member of the Reorganization Commission for Pigs and Pig Products; member of the Reorganization Commission for Fat Stock).

J. Ballantyne, Esq. (Chief Officer for Scotland, London Midland and Scottish Railway Company).

Milk Marketing Scheme.—The result of the initial poll will be declared on or about September 6.

The Minister of Agriculture and Fisheries has appointed the following to be his nominees on the Board:—

The Viscount Lymington (Member of Parliament for the Basingstoke Division of Hampshire; Past President of the National Milk Publicity Council).

Maurice Hely-Hutchinson, Esq., M.C. (Director of Robert Fleming and Co., Ltd., Merchant Bankers).

Milk Price Negotiations : Minister's Appointments.—The Milk Marketing Scheme provides that, for the first year of its operation, the Milk Marketing Board shall consult

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with representatives of the distributors and manufacturers of milk, together with not more than three persons appointed by the Minister, before the Board prescribe any prices, or any terms of a contract affecting prices, for the sale of milk by wholesale. The scheme further provides that, in the event of the Board and the purchasers failing to agree as to prices, the persons appointed by the Minister shall fix the prices and any price so fixed shall be binding upon the Board.

The Minister has appointed the following to act in the circumstances referred to:—

F. M. Russell Davies, Esq., K.C. (Recorder of Worcester; held the recent public inquiry into the Milk Marketing Scheme);

A. E. Cutforth, Esq., C.B.E., F.C.A. (Partner in the firm of Deloitte, Plender, Griffiths and Co., Chartered Accountants; Member of the recent Milk Reorganization Commission; Member of the Food Council);

W. Fraser, Esq., C.B.E. (Deputy-Chairman of the Anglo-Persian Oil Co.).

Amendments to the Hops Marketing Scheme, 1932.

—The Minister has appointed Mr. F. M. Russell Davies, K.C., who held the Public Inquiry into objections to the Milk Marketing Scheme, to hold a Public Inquiry into objections made to amendments of the Hops Marketing Scheme, 1932, which have been submitted to the Minister by the Hops Marketing Board. The hearing will be opened at 10.30 a.m. on Monday, September 11, in Court B, Judges' Quadrangle, Royal Courts of Justice, Strand, W.C.2.

Potato Marketing Scheme.—The Report of Mr. C. T. Le Quesne, K.C., who conducted the Public Inquiry into objections to the Potato Marketing Scheme, has been submitted to the Minister of Agriculture and Fisheries and the Secretary of State for Scotland.

Agricultural Marketing Facilities Committees.—Section 12 of the Agricultural Marketing Act, 1931, provides for the appointment of Agricultural Marketing Facilities Committees for England and Scotland and for the appointment from the members of these committees of an Agricultural Marketing Facilities Committee for Great Britain. These Committees are charged with the duty of considering, and making recommendations with respect to, the making and renewal of loans out of the Agricultural Marketing Funds to Boards administering Schemes under the Act.

The Minister of Agriculture and Fisheries has appointed

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the following as the Agricultural Marketing Facilities Committee for England:—

Lieut.-Col. Sir John R. Chancellor (Chairman), Mr. W. H. Coates, Mr. H. G. Howitt, Mr. W. R. Smith and Sir W. Norman Vernon.

The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have appointed the above named, together with Mr. D. W. Innes, who is a member of the Agricultural Marketing Facilities Committee for Scotland, to be the Agricultural Marketing Facilities Committee for Great Britain.

The Secretary of both Committees is Mr. M. G. Kendall, of the Ministry of Agriculture and Fisheries.

Loans to Marketing Boards.—For the purpose of providing for expenses incurred in connexion with the initial polls, short-term loans from the Agricultural Marketing Fund (England) have been made by the Minister to the Boards administering the Pigs, Bacon and Milk Marketing Schemes, as follows:—

Pigs Marketing Board	...	...	£4,500
Bacon Marketing Board	...	...	£450
Milk Marketing Board	...	...	£8,500

The Meat Situation: Further Reduction of Imports.

—In the second half of this year, meat imports will be further reduced, as follows:—

As regards *chilled beef*, it has already been announced that, in the first half of the present quarter, imports will be 10 per cent. less than the quantities agreed at Ottawa, and 12½ per cent. less during the second half of the quarter. *It is now announced that for the first half of the last quarter of the year the Minister is aiming at a reduction of 15 per cent. or as near thereto as is compatible with the economical use of the shipping space available.*

As regards *frozen beef*, imports from foreign sources will be progressively reduced by 20 per cent. in the present quarter and 25 per cent. in the next quarter below the standard year figures. It is expected that New Zealand will ship no frozen beef at all in the last quarter of this year, while Australian shipments are expected to be smaller than a year ago.

The effect of these further reductions in imports should be to strengthen the beef market appreciably in the coming months and induce a sounder price situation.

As regards *mutton and lamb*, the prospects of better markets are also fair. Imports of foreign frozen mutton and lamb will be subject to the Ottawa reductions of 20 per cent. in the current quarter and 25 per cent. next quarter. As a result, supplies of mutton and lamb from foreign countries will be reduced in the second half of the year by some 6,000 tons compared with the period July to December, 1932. Killings in New Zealand show a reduction of some 12,000 tons compared with last year, while it is estimated that holdings in cold store will be less than those of last year by about 300,000 carcasses

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of lamb and 400,000 of mutton. Australian supplies are also expected to be smaller in the latter half of the year.

As regards *bacon and hams*, imports from foreign countries in the first half of this year were some 16 per cent. below imports in the corresponding period of 1932, and a further substantial reduction is being arranged.

Beet-Sugar Industry: State Assistance for the 1934-35 Campaign.—The nature and extent of the assistance to be given to the beet-sugar industry during a period of one year following the expiration of the present Subsidy Act were indicated by the Minister in his reply to a question in the House of Commons on July 27, 1933. Mr. Elliot said that the Government had decided, as a temporary measure, to introduce legislation next session providing for a subsidy from the Exchequer on sugar and molasses manufactured from home-grown beet between September 30, 1934, and October 1, 1935. In regard to sugar, the subsidy would be at the present rate of 6s. 6d. per cwt.; in regard to molasses, no subsidy would be payable as long as the world price of raw sugar exceeded 6s. per cwt., but subsidy at a rate equivalent to 1½d. per cwt. of sugar would be payable for each 1d. by which the price of sugar was less than 6s. per cwt. until the present maximum subsidy on molasses, equivalent to 9d. per cwt. of sugar, was reached.

The Minister went on to say that this decision was based on the understanding that the refining and beet-sugar manufacturing interests would co-operate in submitting as soon as possible a marketing scheme under the Agricultural Marketing Acts, 1931 and 1933, and that they would be prepared to co-operate in due course with the growers of sugar beet in the promotion of a development scheme under which the operations of sugar manufacture, refining and processing might be rationalized in the interests of greater productive efficiency. Meanwhile, it was the intention of the Government to take such steps as might be necessary and practicable to support existing producers in their efforts to improve their industry in the public interest.

The Minister reminded the House of the announcement made by the Chancellor, in his Budget Speech of 1932, of the Government's intention to hold an inquiry into the sugar industry as a whole. A costing investigation had already been undertaken on behalf of the Government, and further investigation would be necessary. To this end the Government proposed, as soon as possible, to appoint an impartial Committee to make recommendations of a long-

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term character in harmony with the policy expressed in the Agricultural Marketing Acts.

Beet-Sugar Industry: Results of the 1932-33 Campaign.—A comparative statement is given below of the results of the beet-sugar manufacturing campaigns for the years 1931-32 and 1932-33. The beet acreage for 1932-33 showed some recovery from the heavy decline which occurred in the former season. Preliminary figures compiled from the statutory agricultural returns show that for the current season the area planted is the highest on record, viz., 364,000 acres.

	1932-33.	1931-32.
Acreage under sugar beet	255,648	234,174
Average yield per acre (tons)	8·7	7·1
Number of beet growers	34,452	32,897
Number of factories	17	18
Average number of days worked at factories	80	64
Number of workers employed in factories during the campaign	8,100	7,900
Tonnage of beet delivered to factories..	2,232,061	1,667,288
Average sugar content of beets (per cent.)	16·9	17·3
Average price paid per ton of beet ..	42s. 8d.	42s. 4d.
Estimated total sum, including cost of transport, paid by the factories to the growers	£4,762,000	£3,529,000
Total production of sugar (tons) ..	330,325	251,383
Average extraction of sugar expressed as a percentage of beets delivered to factories	14·8	15·1
Average extraction of sugar expressed as a percentage of total sucrose in beets	88	87
Average farm output of sucrose per acre of beet grown (lb.)	3,305	2,759
Average factory output of commercial sugar per acre of beet grown (lb.) ..	2,894	2,405
Production of by-products—		
Molasses (tons)	*780,000	531,739
Pulp—Dry (tons)	159,873	127,314
(Wet) (tons)	25,296	17,524
Subsidy paid—Sugar	£2,145,932	†£1,632,733
Molasses	*£231,000	£157,330
Total	£2,376,932	£1,790,063

Wheat Act, 1932: New Quota Payments Order.—

The Minister, on the recommendation of the Wheat Commission, has made Orders under the Wheat Act, 1932, varying the amount of the quota payment that every miller and every importer of flour is liable to make to the Wheat Commission in respect of each hundredweight of his output

* Subject to adjustment.

† Excludes advances under the British Sugar Industry (Assistance) Act, 1931; these amounted to £183,297 and were paid on 3,085,724 cwt. of sugar.

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of flour, and giving the estimates upon which the new rate is based.

The first of these Orders—the Wheat (Anticipated Supply) No. 1 Order, 1933—prescribes, at 27,000,000 cwt. (6,000,000 qrs. of 504 lb.), the quantity of home-grown millable wheat of their own growing which the Minister anticipates will be sold by registered growers during the cereal year 1933-34. In the second Order—the Wheat (Quota Payments) No. 1 Order, 1933—it is stated that the Minister estimates that the average price obtainable by registered growers throughout the United Kingdom for home-grown millable wheat sold and to be sold by them in the cereal year 1933-34, will be 5s. 8*d.* per cwt. (equivalent to 25s. 6*d.* per qr.) at farm and that the price-deficit per cwt. of such wheat will be 4s. 4*d.* This Order also prescribes 83,600,000 cwt. as the Minister's estimate of the supply of flour for the period August 1, 1933, to July 31, 1934, and provides that the quota payment which every miller and every importer of flour shall be liable to make to the Wheat Commission in respect of each hundredweight of his output of flour on and from August 2, 1933, shall be 16·8 pence (equivalent to 3s. 6*d.* per sack of 280 lb.).

There are two main reasons for the increase in the amount of the quota payment:—

(1) The area under wheat in the United Kingdom in 1933 has increased from 1,343,160 acres to 1,743,950 acres—an increase of 30 per cent.; there is also an expected increase in the yield per acre; hence the quantity of home-grown millable wheat likely to qualify for deficiency payments is very substantially higher than it was in the first year of the operation of the Act. The “anticipated supply” of wheat has, in fact, reached in one bound the figure laid down in Section 2 of the Act as the maximum quantity upon which “deficiency payments” may be made at the full rate.

(2) The income of the Wheat Fund from which the “deficiency payments” are made will this year be derived from quota payments in respect of only twelve months’ deliveries of flour, as against deliveries for 58 weeks in the first accounting period.

Ascertained Average Price of Home-grown Millable Wheat.—After consultation with the Wheat Commission, the Minister has made the Wheat (Ascertained Average Price) Order, 1933, certifying and prescribing that, during

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the cereal year 1932-33, registered wheat growers sold 20,400,000 cwt. of millable wheat of their own growing at an average price of 5s. 4-46d. per cwt.

National Mark Eggs.—The total output of the National Mark Egg Packing Stations for the three months, April to June, 1933, was 144.9 million eggs, of which 111.2 million were packed under the National Mark, as compared with 121.7 million and 97.6 million, respectively, for the corresponding period of 1932. The following table shows the aggregate monthly output of the stations during these periods:—

Month	1932			1933		
	Total output of Packing Stations (fresh eggs)	Output under National Mark	Percentage of total output under National Mark	Total output of Packing Stations (fresh eggs)	Output under National Mark	Percentage of total output under National Mark
	Millions	Millions	Per cent.	Millions	Millions	Per cent.
April -	43.5	34.7	80	52.3	39.7	76
May -	40.1	32.6	81	50.6	38.9	77
June -	38.1	30.3	80	42.0	32.6	78
Totals for 3 months -	121.7	97.6	80	144.9	111.2	77

At the Cambridge Provincial Conference (Poultry Section), held at the School of Agriculture, Cambridge, on July 31, statistics were furnished by the County Poultry Instructor, based upon the returns rendered by the National Mark egg-packing station to which eggs from the Bedfordshire County Laying Trials had been sent. These showed that in the season 1931-32 there was a considerable increase in the number of faults of all kinds in eggs sent to the station, compared with the season 1930-31. From April to September, the faults were from three to four times as numerous as in the period October to March. In hot weather, a marked increase in watery whites occurred. No difference in chemical condition is apparent between normal and watery-white eggs. The research work now being carried out by the Government of Northern Ireland on the occurrence of watery whites appears to indicate that nutrition is not responsible for this condition.

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It is important that further statistics should be obtained, and it was therefore decided that all eggs from County Laying Trials should continue to be sent to a packing station.

National Mark Vegetables.—Two further National Mark schemes for vegetables are being introduced this year—for brussels sprouts and celery—and copies of Marketing Leaflets Nos. 49 and 51, which explain the respective schemes, may be obtained, free of charge, on application to the Ministry.

The scheme for brussels sprouts provides for three grades, according to the size of the produce, viz., *Selected (Extra Small)*, *Selected*, and *Selected (Large)*. Sprouts packed under the National Mark must be clean, fresh, well-formed, firm and compact, and the stalks must be well-trimmed. The sprouts must also be of good colour and free from loose and discoloured leaves and from blemish of any description, whilst reasonable uniformity is necessary as regards size and varietal characteristics. Sprouts of *Selected (Extra Small)* and *Selected* grades will normally be packed in boxes to hold 12 lb. or 28 lb. net weight, while the containers for the *Selected (Large)* grade will be boxes holding 28 lb., bags holding 28 lb. or 40 lb., or nets holding 20 lb. or 40 lb., the net weight to be declared in each instance. The Ministry will, however, be prepared to give favourable consideration to applications to use other containers.

Celery packed under the National Mark will be marketed under two grades, viz., *Selected (Washed)* and *Selected (Unwashed)*. Each head of celery of the *Selected (Washed)* grade must be reasonably well-bleached, trimmed and hearted, sound, free from growth cracks, hollow crowns and other defects, including blemishes of all kinds. The heads in any package must also be of similar varietal characteristics and reasonably uniform in weight, each head to weigh at least 9 oz. and to be trimmed to a length of between 14 and 15 in.

Celery packed under the grade designation *Selected (Unwashed)* will be required to be reasonably free from soil, and in other respects must conform to the same requirements as those specified for *Selected (Washed)* grade.

Each head of *Selected (Washed)* celery must be wrapped in cellophane or grease-proof paper.

National Mark celery of both grades will be packed in non-returnable crates of approved dimensions, but, as with

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brussels sprouts, the Ministry will give favourable consideration to applications from growers for permission to use other containers.

National Mark Dressed Poultry.—The total output of the packing stations operating during the three months, April to June, was 152,000 birds, of which 19,000 were packed under National Mark labels.

After careful review of the experience gained to date, and after consultation with representatives of the packers and of the distributive trades, and with the advice of the National Mark Egg and Poultry Trade Committee, the Ministry has decided to simplify the schedule of grades for dressed poultry. Draft Regulations defining the revised grades and the relative quality requirements have been published, and it is intended to put them into operation forthwith.

The simplification of the scheme and its revision in the matter of grades should enable poultry packers to make a more extensive use of the National Mark. Already a number of new applications for authorization in the scheme have been received. Copies of Marketing Leaflet No. 17, which explains the revised scheme, may be obtained, free of charge, on application to the Ministry.

Displays of National Mark and other Home Produce.—Home produce (including National Mark) will be displayed on the England and Wales stand in the Empire Marketing Board Section at the International Confectioners' and Bakers' Exhibition, September 2-8, and at the International Grocers' Exhibition, September 16-22, to be held in the Agricultural Hall, London. The Ministry will also have a stand at the Ashton-under-Lyne Ideal Homes and Industries Exhibition, September 20-30, for the display of National Mark produce.

Marketing Demonstrations.—The series of National Mark marketing demonstrations given by the Ministry at agricultural shows this season will be concluded in September, when the following shows will be visited:—Brecknockshire (Brecon), September 9; Altrincham, September 20; Thame, September 21. The Ministry will also have a stand at the National Honey Show, Crystal Palace, September 13-16.

At the Royal Welsh Show, Aberystwyth, July 26-28, an egg-grading demonstration was included in the Ministry's

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stand, which was visited by H.R.H. Prince George. The Ministry also carried out a demonstration of the grading of Welsh lambs. The object of the demonstration, which attracted much attention, was to illustrate, by means of six lamb carcasses (three of a lower and three of a higher weight range), the grades—*Selected*, *Prime* and *Good*—used in connexion with the experimental scheme that is in operation in Manchester, Birmingham and Leeds for the marketing of gradable fat lambs consigned direct from farm to abattoir for sale on a grade and dead-weight basis. The scheme is the same in principle as that which is in operation for fat cattle, and, briefly, works as follows. Senders inform the Ministry's Head Grader, at the wholesale meat market to which they desire to forward their lambs, of the number and general description of the lambs on offer, including the breed or "cross," the approximate average live weights and the approximate date on which they can be dispatched. Quotations are then obtained by the Head Grader from a number of wholesale carcass butchers. The quotations are based on the grades reached by the lambs—i.e., *Select*, *Prime* or *Good*, and on the dead weight per lb. (sinking the offal). Rejects—i.e., ungradable lambs—are disposed of "on commission."

The most favourable quotation is forwarded to the farmer, who then decides whether the prices quoted are sufficiently attractive. If he decides to send the lambs, he notifies the Head Grader, who forwards to him the necessary particulars as to date of consignment, marking and so on. The wholesale butcher pays the sender according to the grades and dead weights reached by the lambs, these being certified by the Ministry's Grader.

Full information with regard to the scheme is contained in Marketing Leaflet No. 46, obtainable free of charge on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

SEPTEMBER ON THE FARM

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Farming Procedure.—For many, Michaelmas constitutes the ending and beginning of another farming year, and especially in the arable counties of the south and east of England. It is an opportune moment, therefore, to take stock of farming procedure and practice in the light of present-day requirements. In the arable areas the feeling of confidence is more marked than for some time past. Two factors have contributed to this end, viz., the operation of the Wheat Quota legislation and the continuance of assistance for the beet-sugar industry. The wheat and sugar-beet crops have attained a measure of popularity that is foreign to most other branches at the present time. The planning of future policy will be largely affected by the success or otherwise of schemes designed to evolve a better system of marketing. It is frequently asserted that these new measures and proposals are robbing the farmer of his individuality. This is probably true of all schemes that afford protection. Whereas in the past control has been exercised as a means of safeguarding the health of the community through regulations affecting the sale of meat and milk for example, so in the immediate future control is designed to safeguard the economic health of the industry, and it is from this viewpoint that such schemes must be regarded.

Apart from national factors that have a very close bearing on the economics of farming it is still necessary to pay careful attention to the details of farming policy. Rival schools exist in regard to the question of specialization or generalization in farming. It is extremely difficult to arrive at any satisfactory conclusion as to the better policy. With most farmers sentiment plays a very strong part, though it is to be noted that the younger generation is not so closely tied to this as the older. Corn-growing under specialized conditions where large-scale mechanized methods are employed appears on paper to offer greater opportunities than corn-growing under mixed farming conditions. Obvious difficulties crop up, however. Thus not all farms are equally ideal for mechanized farming by reason of such

suitable factors as soil and the lay-out and distribution of fields. Yet again, its success presumes that wheat and barley, for example, will maintain a price at which a profit can be realized by extensive farming methods. From the sentimental standpoint perhaps the greatest objection that can be raised against it is the depopulation of the land that will almost certainly result. The growth of crops other than cereals, however, does open out possibilities of removing this objection, while the suggestion that farming without live stock will reduce the output of crops is not supported by some of the examples that exist. Much depends on the degree of skill employed and the selection of a suitable rotation of crops.

Generalized or mixed farming aims at the distribution of farming capital among several branches. In the main it has been associated with live stock, and, singularly enough, when arable farming, devoted to crops for which stable prices exist, has come into its own, the live-stock industry has been very hard hit. In this sense the wisdom of balancing live stock with arable farming interests will be recognized. The writer believes that successful live-stock farming is closely associated with arable interests. In the old days it was assumed that live stock were essential to successful arable farming by reason of the availability of farmyard manure. This does not feature so extensively in modern teaching or practice. It is scarcely sound practice to keep animals solely for the production of manure. When, however, animals can be kept at a profit and the manure is available as a by-product, then a new turn is given to this question. It has to be recognized that on the lighter types of soil there are limitations to the effectiveness of artificial fertilizers. If the climate is normally dry or a period of extended drought is experienced, a reserve of organic matter is a considerable asset. This in short is where farmyard manure proves of inestimable value.

Labour.—Labour costs are amongst the heaviest of farming expenses. This makes it necessary to study labour problems very closely in order to secure an adequate return for the expenses incurred. On some stock farms the labour problem is aggravated by buildings that do not lend themselves to ease in working. Under these conditions rearrangements should be effected wherever possible. The employment of labour continuously on productive duties is probably best realized on a stock-rearing farm, and it is

a satisfactory arrangement where the load of work can always be adjusted to the labour capacity of the farm.

Equipment.—The mechanical equipment of the farm itself also needs close attention in relation to the labour bill. It is a sound axiom never to put away an essential implement in a broken-down condition. Repairs are best effected when they are fresh in the memory. Similarly, the purchase of implements at farm sales should be wisely made.

Waste.—The question of waste is also one that deserves to be closely watched. The economical feeding of stock made possible by careful rationing is a case in point. Modern farming is in fact a constant study of details, many of them small in themselves, but in sum total amounting to respectable proportions. Waste is sometimes best dealt with in a collective manner. The rat problem is not easily solved unless general action is taken. The same applies to rabbits, sparrows, rooks and pigeons, all of them responsible for enormous waste.

Milk-Recording.—Most dairy farmers appreciate and approve of the work of milk-recording societies, but it is unfortunate that in some instances difficulties are cropping up in the maintenance of recording strength. One has to recognize the temptation to prune expenses at a period when every shilling counts, but it is desirable to emphasize the necessity for wise spending, especially in the registration of performance. Many who have been members of milk-recording societies continue to record their milk yields privately. The objection to this course is that records obtained without official inspection can only be used for private purposes. Milk-recording is of especial benefit in a breeding herd where the heifer progeny are to be retained as the successors to their dams. Outstanding performance on the part of one or two cows is sufficient to form the nucleus of a good herd. This has been illustrated in a good many examples.

The question of a profitable average yield per cow is a debatable one. In theory, the higher the yield the greater the profit. This often breaks down in practice, especially when high yields are obtained at the expense of costly feeding or involve a strain on the constitution of the animal, resulting in a heavy depreciation of the herd. Similarly, high yields have sometimes been secured by rigorous culling of all low yielders for the year in question. A cow that has

a very long rest period in summer may be a means of reducing the herd average. There is therefore a temptation to dispose of such an animal, notwithstanding the fact that a cow dry in summer is cheaply kept and that it may be uneconomic to dispose of her. The first duty of a member of a milk-recording society is to think of the soundness of his dairying policy and not to be over-concerned about the position of his herd in the Society's averages. The latter may cost money. It is desirable, however, to aim at a policy of a calf a year together with an output of milk in the region of from 800 to 1,000 gallons for mature cows. A very small proportion of cows actually reach this performance, notwithstanding all the advances in the knowledge of feeding, management and breeding. Breeding seems to be the principal obstacle. The use of a prepotent bull is probably the first essential so far as the perpetuation of high yielding qualities is concerned. This point is greatly appreciated in milk-recorded herds, and emphasizes the necessity for supporting schemes designed to promote the keeping of sires until their progeny have been proved.

As a means of ensuring that young sires employed in dairy herds are calculated to maintain a satisfactory yielding level through their progeny, the study of the records of their dams and sires' dams is most important. Here again the outstanding factor should be the association of persistent high yields over several years, rather than one spectacular record. Similarly, it is advisable that some knowledge should exist as to the system of management employed to secure such yields. Some cows qualify as bull breeders by reason of very heavy feeding and careful nursing. Others qualify without undue forcing and have an ample margin to spare. It is this latter type of animal that, rightly, appeals to most dairy farmers, and milk records will usually indicate the type of animal involved.

N.B.—The milk-recording year commences at midday on October 1.

Seasonal Work.—Up to the present this has been a most unusual season. Hay harvest was carried out under more or less ideal conditions, and has been followed by yet another ideal period for corn harvest. In the Midlands it is very rarely that the cutting of spring-sown cereals commences until the middle of August, while harvest is rarely completed before the third or fourth week in September.

SEPTEMBER ON THE FARM

This year's harvest should be completed well before these notes appear at the beginning of September; in some instances, indeed, it was completed in the second week of August, which must constitute a record for many years. An early harvest invariably proves acceptable, since it becomes possible to take advantage of the remaining summer weather to pull up corn stubbles for cleaning, to get dung carted from the yards direct to the fields, and to make an early start on the preparation of land for wheat. It is an undoubted asset to prepare wheat land early, for the "stale" furrow is generally best, if only because it is the means of encouraging an early germination of weed seeds, so that the young weeds may be destroyed later in the normal working-down operations. In making possible this early preparation of the land the light tractor has been a boon on most farms.

The determination of the most suitable place for wheat in the rotation is best left to the experience of the locality. For the past four years the writer has had exceptionally good results with wheat following potatoes, which in turn have followed a one-year's seeds ley.

Time spent in the cleaning of land is well worth while, for not only does it enable the wheat crop to make more satisfactory progress, but it eases the problem of harvesting by providing a cleaner crop. There is some evidence that following the working about of wheat land, better results are secured by leaving a firm seed bed. This is the objection of some to potato land, which is apt to be too hollow for a succeeding crop of wheat. Where this is so, the trouble can be overcome by the use of the furrow press or even a roller. The furrow press is a most valuable implement, and it is remarkable that its use has so often been discontinued. It is interesting to observe that the pioneers of mechanized arable farming in Norfolk set great store on this implement in the preparation of wheat land.

Sowing of wheat is rarely done in September. In the eastern Midlands the best results are obtained from seedings made in late October or early November. Some decision should, however, be made concerning the varieties to sow. This has been greatly simplified as a result of the trials that have been conducted by the National Institute of Agricultural Botany, and one of the most refreshing features of present-day seedsmen's catalogues is the disappearance of many varieties that were formerly included, but that have

SEPTEMBER ON THE FARM

proved to be synonyms of existing types. On the farm of the Midland Agricultural College only two varieties commonly grown can be counted upon to resist lodging. These are the Swedish Steel, a derivative of the older Iron, and Yeoman. This is one of the fruits of a policy of high farming that has been practised for the past five years.

The lifting of main crop potatoes normally commences towards the end of the month, but here again the indications are that the crop will be ready much earlier than usual. The best sign of ripeness is the firmness of the skins of the tubers. Mechanical lifters are usually employed for harvesting, although in certain areas, particularly in the Fens, hand-lifting is extensively practised. Thus on a piece-work basis it is usual to reckon a hand-lifting output of three tons per eight-hour day per man and woman employed—the man digging and the woman picking and bagging. This is convenient where direct sales from the field are to be effected.

PRICES OF ARTIFICIAL MANURES

Description	Average price per ton during week ended August 2nd				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 8 16d	£ 8 16d	£ 8 16d	£ 8 16d	s. 11 4
" " Granulated (N. 16%) ..	8 16d	8 16d	8 16d	8 16d	11 0
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 15d	6 15d	6 15d	6 15d	6 7
Calcium cyanamide (N. 20.6%)	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 10	3 5	3 2	3 7g	4 9
Potash salts (Pot. 30%) ..	5 13	5 10	5 7	5 11g	3 8
" " (Pot. 20%) ..	4 1	3 17	3 14	3 19g	3 11
Muriate of potash (Pot. 50%)	10 9	10 2	9 15	10 5g	4 1
Sulphate,, " (Pot. 48%)	12 5	12 0	11 15	12 3g	5 1
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
" " (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%)	3 2	..	3 4	2 16k	3 6
" " (S.P.A. 13½%)	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	6 10	6 5	6 7f	6 7	..
Steamed bone-flour (N. ½%, P.A. 27½-29½%) ..	5 15	5 7	5 2f	5 7	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, and for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
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Feeding and Sterility: Additional Note.—In the notes for August the writer dealt briefly with certain aspects of feeding in relation to sterility, and from correspondence received it appears that the subject is one about which stockbreeders are deeply concerned. Between the time when the notes were written and the issue of the August JOURNAL, there appeared in the *Scottish Journal of Agriculture* an article on the same subject by Buchanan Smith, who dealt fully with the matter in its various aspects. Those specially interested are advised to read Buchanan the Sterility Sub-Committee of the Scottish Committee of Research Workers.

A correspondent has asked for some further information on the matter of mineral deficiency, and in this connexion it is of interest that Buchanan Smith states that phosphorus deficiency is perhaps most widespread, and has been noted particularly in South Africa, Australia and the United States, as a cause of abortion and sterility. On the other hand, he says that in the United Kingdom phosphorus deficiency is not acute. Deficiency of calcium (lime), which is of less importance to the world at large, has been shown definitely to lower the fertility of some flocks on the hill pastures of Scotland, and it has been found that a deficiency of lime in the rations of breeding sows leads to a considerable increase in the number of pigs born dead. As far as England and Wales are concerned, available evidence seems to indicate that deficiency of phosphorus is relatively unimportant, whereas lime deficiency is apparently by no means uncommon. We know that the agricultural soils of the country generally show a fairly high lime requirement. This is partly due to the policy followed in the treatment of land in recent years. Liming has been out of fashion, but there is now reason to believe that if economic conditions were more favourable, the practice of liming would be to a great extent revived. Of late, however, the application of lime to grass land has given less immediate

NOTES ON FEEDING

financial return than the use of basic slag. The more general use of the latter fertilizer has tended to maintain and increase the balance of phosphorus, but while it has helped to limit to some extent the depletion of the available lime supply, it has not entirely made good the amount of lime withdrawn from the soil through crops, live stock and natural agents.

The writer has been asked why steamed bone flour was not included in the mineral mixture recommended in last month's notes. The reason is that, as far as we can tell from the evidence outlined above, it would seem that there is an adequate supply of phosphorus in the ordinary balanced rations or average grazing on which cattle, sheep or pigs are normally kept in this country. Further, there may be some danger in upsetting the balance of phosphorus by giving an additional supply in the form of steamed bone flour. It is possible, of course, that this assumption is incorrect, and it is recognized that one should not be dogmatic on the subject of mineral feeding. No particular mineral mixture can possibly be suitable for all sets of circumstances, because these vary. Nevertheless, we find pretty conclusive evidence of the lack of calcium. We have definite and visible proof of the need for salt, and there would not seem to be much room for doubt that iodized salt is preferable to ordinary salt. For these reasons the simple lime with iodized-salt mineral mixture was suggested, but wherever a stock breeder feels that his conditions are such that there may be positive phosphorus deficiency, then he would be prudent to include a proportion of sterilized steamed bone flour in his mineral mixture. A diet low in phosphorus lengthens the interval between periods of heat.

The Feeding Value of Oats.—At the time of writing, oats are being quoted in certain districts at 13s. 6d. per quarter. The value of oats for feeding at the present time is therefore worthy of special attention, and in view of the acceptance of the Pigs and Bacon Marketing Scheme, Blissett's* contribution on the use of oats in pig feeding is particularly opportune. It has been the view of most pig keepers that oats are comparatively unsuitable for pigs because of the presence of the husk. Nevertheless, we find that Continental pig feeders frequently use oats to the extent of 40 per cent. of the ration in the feeding of sows and bacon pigs; while oats, in the form of Sussex ground

oats, have been successfully fed to pigs in England, the limiting factor, as regards this form of oats, having been simply one of price.

At the Duthie Experimental Stock Farm, ordinary crushed oats were used up to 30 per cent. of the ration for pigs under 100 lb. live weight, and increased to 70 per cent. for pigs over 100 lb. live weight. Sussex ground oats were given at the rate of 70 per cent. of the ration to the younger pigs. It is interesting to note that the crushed oats gave satisfactory results both in regard to the food consumed per lb. l.w. increase (3.80 lb.) and the cost per 1 lb. gain (3.38 pence). The cost of refining the oats by removing the husk was not economic. It is probable that good quality Aberdeenshire-grown oats were used in these experiments; such oats are normally of better quality and thinner in the skin than those grown further south, where the growing season is shorter. Nevertheless the experiment indicates that good quality oats might be more widely used in pig feeding. The current low prices of oats, together with the stimulus that the fixed price for bacon pigs is calculated to give to pig production in this country, should result in a fresh outlet and better market for a proportion of the oat crop.

* *Scottish Journal of Agriculture*, July, 1933.

NOTES ON FEEDING

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	5 13
Maize	78	7.6	4 9
Decorticated ground-nut cake ..	73	41.3	7 15
„ cotton cake ..	68	34.7	7 5

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.33 shillings, and per unit protein equivalent, 1.75 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The “food values,” which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1932, issue of the Ministry's JOURNAL, p. 781.)

FARM VALUES.

CROP	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9.6	5 13
Oats	60	7.6	4 14
Barley	71	6.2	5 5
Potatoes	18	0.8	1 5
Swedes	7	0.7	0 11
Mangolds	7	0.4	0 10
Beans	66	19.7	6 2
Good meadow hay	37	4.6	2 17
Good oat straw	20	0.9	1 8
Good clover hay	38	7.0	3 3
Vetch and oat silage	13	1.6	1 0
Barley straw	23	0.7	1 12
Wheat straw	13	0.1	0 17
Bean straw	23	1.7	1 14

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway W.C.2, price 6d. net.

Description	per ton	value per ton	value per ton	equiv. per 100 lb.	per unit starch equiv.	per lb. starch equiv.	Pro- tein equiv
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	6 17½	0 10	6 7	72	1 9	0.94	9.6
Barley, Canadian No. 3 Western ..	5 18½	0 8	5 10	71	1 7	0.85	6.2
" Argentine	5 18	0 8	5 10	71	1 7	0.85	6.2
" Danubian	5 10*	0 8	5 2	71	1 5	0.76	6.2
" Persian	5 10*	0 8	5 2	71	1 5	0.76	6.2
" Russian	5 10½	0 8	5 2	71	1 5	0.76	6.2
Oats, English white (new) ..	6 5†	0 9	5 16	60	1 11	1.03	7.6
" Scotch white	6 10	0 9	6 1	60	2 0	1.07	7.6
" Canadian No. 2 Western ..	6 7	0 9	5 18	60	2 0	1.07	7.6
" " No. 3	6 0	0 9	5 11	60	1 10	0.98	7.6
" " mixed feed	5 0*	0 9	4 11	60	1 6	0.80	7.6
" Argentine	5 8	0 9	4 19	60	1 8	0.89	7.6
" Russian	5 15†	0 9	5 6	60	1 9	0.94	7.6
Maize, American	4 12†	0 8	4 4	78	1 1	0.58	7.6
" Argentine	4 12	0 8	4 4	78	1 1	0.58	7.6
" Gal. Fox	4 5†	0 8	3 17	78	1 0	0.54	7.6
" Russian	4 0½	0 8	3 12	78	0 11	0.49	7.6
" South African	4 15†	0 8	4 7	78	1 1	0.58	7.6
Peas, Japanese	23 5†	0 17	22 8	69	6 6	3.48	18.1
Dari, Egyptian	6 10†	0 10	6 0	74	1 7	0.85	7.2
Milling offals—Bran, British ..	4 12	1 0	3 12	43	1 8	0.89	9.9
" " broad	5 0	1 0	4 0	43	1 10	0.98	10
Middlings, fine imported ..	5 2	0 14	4 8	69	1 3	0.67	12.1
" " coarse British	5 7	0 14	4 13	56	1 8	0.89	10.7
Pollards, imported	4 10	0 19	3 11	62	1 2	0.62	11
Meal, barley	7 7	0 8	6 19	71	1 11	1.03	6.2
" " grade II	6 12	0 8	6 4	71	1 9	0.94	6.2
" " maize	5 12	0 8	5 4	78	1 4	0.71	7.6
" " South African	5 7	0 8	4 19	78	1 3	0.67	7.6
" " germ	5 10	0 13	4 17	79	1 3	0.67	8.5
" locust bean	6 12	0 7	6 5	71	1 9	0.94	3.6
" bean	8 0	1 0	7 0	66	2 1	1.12	19.7
" fish	15 0	2 16	12 4	59	4 2	2.23	53
Maize, cooked flaked	5 17	0 8	5 9	84	1 4	0.71	9.2
" " gluten feed	5 17	0 15	5 2	76	1 4	0.71	19.2
Linseed cake, English, 12% oil ..	8 17	1 4	7 13	74	2 1	1.12	24.6
" " " 9% "	8 12	1 4	7 8	74	2 0	1.07	24.6
" " " 8% "	8 7	1 4	7 3	74	1 11	1.03	24.6
" " " Indian 7% "	8 0†	1 4	6 16	74	1 10	0.98	24.6
Soya-bean cake, 5½% oil	7 17†	1 13	6 4	69	1 10	0.98	36.9
Cottonseed cake—English, Egypt- tian seed, 4½% oil	5 2	1 4	3 18	42	1 10	0.98	17.3
" " English, Indian seed, 4% oil	5 5½	1 4	4 1	42	1 11	1.03	17.3
" " Egyptian, 4½% oil ..	4 15	1 4	3 11	42	1 8	0.89	17.3
" " decorticated 8% " ..	7 5†	1 14	5 11	68	1 8	0.89	34.7
" " meal, decorticated 7-8% ..	7 5†	1 14	5 11	68	1 8	0.89	34.7
Coconut cake, 6% oil	6 5†	1 1	5 4	77	1 4	0.71	16.4
Ground-nut cake, 6-7% oil ..	6 17	1 2	5 15	57	2 0	1.07	27.3
" " decor. 6-7% oil	7 15	1 12	6 3	73	1 8	0.89	41.3
Palm-kernel cake, 4½-5½% oil ..	6 0†	0 14	5 6	73	1 5	0.76	16.9
" " " meal, 4½% oil	6 0†	0 14	5 6	73	1 5	0.76	16.9
" " " meal, 1-2% oil	5 10	0 15	4 15	71	1 4	0.71	16.5
Feeding treacle	5 0	0 9	4 11	51	1 9	0.94	2.7
Brewers' grains, dried ale	4 5	0 15	3 10	48	1 6	0.80	12.5
" " " porter	3 17	0 15	3 2	48	1 4	0.71	12.5
Dried sugar beet pulp (a)	4 5	0 6	3 19	66	1 2	0.62	5.2

* At Bristol. † At Liverpool. ‡ At Hull. (a) Carriage paid in 5 ton lots.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of July, 1933, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 24s. per ton as shown above, the food value per ton is £8 16s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.19d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculation a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N, 6s. 7d.; P₂O₅, 3s. 8d.; K₂O, 3s. 8d.

MISCELLANEOUS NOTES

Midland College Poultry Conference

THE tenth Annual Poultry Conference of the Midland Agricultural College, Sutton Bonington, Loughborough, will be held there this month (September 19) under the Chairmanship of Mr. Victor R. Pochin (Vice-Chairman of the Leicestershire County Council), who will open the proceedings at 10.45 a.m. At the morning session, Mr. W. M. Golden will read a paper on "Selection for Breeding," upon which a discussion will be opened by Major H. Whaley. Mr. J. K. Knowles will follow with a paper on "A Method of Disposal of Surplus Poultry," about which a discussion will be started by Mr. A. P. F. Grant of the Ministry.

In the afternoon, after the presentation of the College Challenge Cup to the winner of the Inter-County Laying Trials, Mr. R. E. Louch, Superintendent of the Northern Breeding Station, will give a summary of the work of his Station, and Mr. E. A. Sizen will initiate the ensuing discussion. The discussion on the final paper, "The Folding System of Poultry-Keeping," to be read by Miss J. W. Strang (Chief Poultry Instructress at the Moulton Farm Institute), will be opened by Mr. George A. Palmer. After the Chairman's address, the Conference will conclude with an inspection of the College buildings and poultry plant.

Further particulars of the Conference, information as to accommodation, meals, etc., can be obtained on application to the Principal, Dr. Milburn, at the College.

Guide to Current Official Statistics

THE new volume of the *Guide to Current Official Statistics* is now ready.* Published annually, this work provides a very necessary key to the large amount of statistical information, relating to a wide range of subjects, including agriculture, that is contained in the hundreds of surveys, periodicals, returns and reports issued each year by Government Departments. It gives not only a list of the titles and prices of the official publications that contain statistics but includes, also, an extensive alphabetical index showing the nature and scope of the information available on each particular subject.

* Volume XI, relating to the year 1932. 344 pp. Obtainable through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price 1s., or post free 1s. 5d.

MISCELLANEOUS NOTES

Export of Breeding Stock

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during the three months ended June, 1933, compared with the corresponding period of 1932. (From returns supplied by H.M. Customs and Excise.)

	1933		1932	
	Number	Declared value	Number	Declared value
CATTLE		£		£
Argentina	60	14,055	74	9,505
France	—	—	7	260
Italy	5	250	—	—
Uruguay	12	973	11	790
Australia	5	1,065	3	475
Canada	11	1,166	32	1,710
Gibraltar	—	—	19	720
Irish Free State	146	2,901	333	7,374
Kenya	1	40	3	122
Union of South Africa	3	295	8	1,193
Other countries	4	550	6	255
Total	247	21,295	496	22,404
SHEEP AND LAMBS				
Brazil	28	940	—	—
Chile	10	310	—	—
France	—	—	61	620
Italy... ..	—	—	25	125
Irish Free State	—	—	78	208
Jamaica and Dependencies	2	40	—	—
Tanganyika Territory	—	—	33	368
Union of South Africa	3	33	—	—
Other countries	—	—	2	120
Total	43	1,323	199	1,441
SWINE				
Belgium	2	25	6	60
Brazil	15	120	0	—
Italy... ..	1	16	27	135
Netherlands	—	—	5	43
Irish Free State	10	182	151	960
Newfoundland and Coast of Labrador	16	53	—	—
Union of South Africa	—	—	6	66
Other countries	3	40	5	77
Total	47	436	200	1,341

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The Agricultural Index Number

THE July index of agricultural produce at 101 was 1 point higher than in June and 5 points below the level of July last year. Live stock generally were cheaper, while butter and eggs were dearer, these movements being in accordance with the usual trend at this season of the year. Wool showed an appreciable increase in price.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	102
June	153	140	131	123	111	100
July	145	141	134	121	106	101
August	144	152	135	121	105	—
September	144	152	142	120	104	—
October	139	142	129	113	100	—
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—The upward movement in wheat prices has continued and there was an increase of 3*d.* per cwt. to an average of 6*s.* 7*d.* and the index rose 1 point to 81. Barley, however, at an average of 6*s.* 7*d.* per cwt. was 5*d.* cheaper and the index fell 6 points to 88. Quotations for oats were unaltered during the month under review.

Live Stock.—Prices of fat cattle, sheep and pigs continued to fall during June, fat cattle being 4*d.* per cwt. cheaper, fat sheep declined by $\frac{1}{2}$ *d.* per lb., bacon pigs by 2*d.* and pork pigs by 3*d.* per score. Dairy cows were about 10*s.* per head dearer during July while store cattle, sheep and pigs were cheaper. In several cases, however, the indices for live stock were higher on the month, owing to a proportionately greater decline in price in the base period.

Dairy and Poultry Produce.—A slight increase in milk contract prices occurred in some areas during July, and the index for milk was 4 points higher at 142. Butter was about $\frac{3}{4}$ *d.* per lb. dearer during the month under review and the index 3 points higher at 94. Quotations for eggs followed the normal seasonal trend, with an average increase of about 1 $\frac{1}{2}$ *d.* per dozen; the index at 103 was, however, 11 points lower than a year ago. Fowls and ducks were cheaper than in June, in accordance with the usual seasonal trend.

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Other Commodities.—The change over from old crop potatoes to new crop is usually accompanied by an increase in prices and an increase has occurred this year. New potato prices this July, however, are 5 per cent. below pre-war, as against 34 per cent. above pre-war in the corresponding period in 1932. Clover and meadow hay were a little cheaper on the month. Wool has shown an appreciable increase in price during July and the index has risen 9 points to 72, which is the highest figure recorded since March, 1932.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	July	July	Apr.	May	June	July
Wheat	77	79	68	71	80	81
Barley	81	94	82	85	94	88
Oats	88	101	81	76	77	75
Fat cattle...	129	117	100	97	95	98
„ sheep...	138	97	116	120	114	107
Bacon pigs ...	100	87	112	107	97	94
Pork „ ...	110	86	116	107	96	93
Dairy cows ...	127	112	106	101	104	105
Store cattle ...	131	113	99	99	94	96
„ sheep ...	153	90	84	84	83	87
„ pigs ...	131	84	123	112	106	108
Eggs	119	114	93	92	102	103
Poultry	144	119	124	132	132	126
Milk	152	143	153	138	138	142
Butter	110	104	91	85	91	94
Cheese	128	131	111	115	121	125
Potatoes	179	134	87	97	80	95
Hay	87	66	66	68	69	68
Wool	66	58	62	62	63	72

United Dairies' Scholarships

THE award of United Dairies' Scholarships for the year 1933-34 was announced recently. These scholarships, which are awarded annually, are provided from the Fund created in 1924 by United Dairies, Ltd., for the purpose of promoting and encouraging practical and scientific education in dairying and dairy farming. They are available for the sons and daughters of farmers and smallholders in the counties of Cornwall, Devon, Dorset and Somerset, and are tenable at various agricultural colleges. The scholarships

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awarded this year, the colleges at which they are tenable, and the names of the successful candidates, are as follows:—

Reading University:

3-YEAR DEGREE COURSE IN AGRICULTURE—

R. J. House, Dorchester, Dorset.

L. W. Osborne, Wincanton, Somerset.

2-YEAR DIPLOMA COURSE IN DAIRYING—

Isobel M. Gardiner, Bratton Clovelly, Devon.

1-YEAR COURSE IN AGRICULTURE—

C. M. Kallaway, Clayhidon, Devon. (Holds a U.D. Scholarship, granted 1932, at Somerset Farm Institute.)

Seale-Hayne Agricultural College:

1-YEAR EXTENSION COURSE IN DAIRYING—

H. W. Hicks, Merrymeet, Cornwall. (Holds a U.D. Scholarship, granted 1932, at this College.)

Somerset Farm Institute:

1-YEAR COURSE IN DAIRYING—

Olive K. Osborne, Curry Mallett, Somerset.

Gwendolen J. Mann, Mawnan, near Falmouth, Cornwall.

6-MONTHS' COURSE IN DAIRYING—

Margaret M. Lewis, Burtle, Somerset.

Agricultural Research Scholarships and Studentships

ON the recommendation of the Agricultural Research Council, post-graduate Scholarships and Studentships have been awarded to the following:—

By the Ministry of Agriculture and Fisheries.

AGRICULTURAL RESEARCH SCHOLARSHIPS.

P. S. Milne, B.Sc.

J. H. Western, B.Sc.

A. H. A. Wynn, B.A.

STUDENTSHIP FOR RESEARCH IN ANIMAL HEALTH.

J. C. D. Hutchinson, B.A.

By the Department of Agriculture for Scotland.

STUDENTSHIP FOR RESEARCH IN ANIMAL HEALTH.

J. S. S. Inglis, B.Sc., M.R.C.V.S.

These awards are made with the object of training students for research work in agricultural science or diseases of farm stock. They are tenable for not more than three years, commencing with the forthcoming academic year.

An International Registry of Chemical Information

To keep abreast of the ever-increasing mass of information respecting their work is one of the great perplexities of scientific and technical workers; and, with a vast amount of research and investigation proceeding in all quarters of the

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world, the problem has become one of international concern. The solution seems to be the establishment of international registries that will file particulars of the sources and kind of available information in specialized fields of activity, and several such institutions are already in existence. One of the latest, started last year for chemical documentation, is the Office International de Chimie, 49, Rue des Mathurins, Paris 8e. Its programme of operations was drawn up at a conference of International experts representing France, Germany, Italy, Holland, Belgium, Switzerland, Spain and Great Britain, Professor J. C. Philip, of the Imperial College of Science and Technology, London, attending on behalf of the last-named. The principal tasks of the new International Office will be to render accessible to all interested persons the existing information accumulated in various centres, depots and collections; to facilitate the registering, filing and diffusion of future documentary information; and to ensure co-ordination between the documentation relating to chemistry and that concerning other branches of scientific knowledge.

Enforcement of Minimum Rates of Wages.—During the month ending August 14, legal proceedings were taken against seven employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed			Costs allowed			Arrears of wages ordered			No. of workers involved	
		£	s.	d.	£	s.	d.	£	s.	d.		
Hampshire	Romsey ...	—			—			32	0	0	1	
Lancashire	Lancaster...	3	0	0	0	7	6	6	5	0	1	
Nottingham	Retford ...	3	0	0	0	10	6	6	14	0	1	
do. ...	do. ...	4	0	0	0	10	6	25	18	0	1	
Suffolk ...	Eye ...	1	0	0	—			0	15	0	1	
Sussex ...	Uckfield ...	1	0	0	—			35	9	6	1	
Wiltshire ...	Malmesbury	*1	0	0	2	14	6	6	15	0	1	
		£	13	0	0	4	3	0	113	16	6	7

* In addition proceedings were taken against this employer under Section 9 (3) (a) for molesting and a fine of £20 was imposed.

Foot-and-Mouth Disease.—Since last month's (August) issue of this JOURNAL went to press, the Ministry has confirmed the existence of four further cases of Foot-and-Mouth disease in Great Britain. Two of these cases occurred in the County Borough of Leicester and the other two in Hampshire. Restrictions have been imposed on the movement of all cattle, sheep, pigs, goats and deer within areas surrounding the various infected premises.

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Colorado Beetle at Tilbury

THE discovery, on August 23, of three specimens of the Colorado Beetle near Tilbury Docks and the consequent issue of the Colorado Beetle Order of 1933 were recorded in last month's issue of this JOURNAL (p. 489).

The Director of the Ministry's Plant Pathological Laboratory went immediately to the scene of the outbreak to take charge of the operations, and a staff of Inspectors, under his direction, proceeded to examine all the potato crops within a radius of 10 miles of Tilbury.

The allotment on which the beetles were found, lies between Dock Road and the railway line immediately north-west of Tilbury West Junction, in the parish of Chadwell St. Mary, and was declared to be an Infected Place under the Colorado Beetle Order. The potatoes on the allotment were lifted, with the exception of a few plants that were left as a trap crop, and the haulms of the lifted potatoes were burned. The soil in the affected area has been thoroughly fumigated with carbon bisulphide in order that any beetles that may have gone to ground may be destroyed. Fortunately the allotment concerned, and other allotments in the immediate neighbourhood, are isolated from the main agricultural area of Essex by a belt of grass land that would not be capable of supporting Colorado Beetles.

No further signs of Colorado Beetles were found during the examination referred to above, but as a precaution, the foliage of all field crops of potatoes within a radius of 10 miles from Tilbury on the Essex side of the river and a radius of 5 miles in Kent were sprayed with an insecticide wherever the foliage remained green and in a condition to attract the beetles. Over 2,000 acres in all were thus

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sprayed, the operations being completed by September 8. It is confidently hoped that these measures, followed, if necessary, by similar measures next year, will confine this infestation to the present very limited area and ensure its successful extirpation. The Ministry desires to acknowledge the ready assistance given by farmers, allotment holders, and the public generally throughout the area affected.

Several rumours have been current to the effect that the Colorado Beetle had been seen in various places, but inquiries made by the Ministry do not confirm the existence of the pest in any district other than Tilbury. In this connexion the Ministry desires it to be known that the Colorado Beetle Order of 1933 requires that the existence or suspected existence of the Beetle shall be notified direct to the Ministry, and that the notification shall be accompanied when practicable by a specimen. Vague statements as to the suspected presence of the Beetle in any district deserve the strongest condemnation. If any beetle is thought to be a Colorado Beetle, the sending of a specimen to the Ministry for identification will prevent much waste of time and money.

The attention of the Ministry has been drawn to a paragraph that appeared in some editions of a Sunday newspaper, in which it was stated that the Ministry of Health was taking action against the Colorado Beetle in the potato-growing lands of Norfolk and that millions of the beetles had been killed. There is no justification whatever for these statements. The Ministry has thought it desirable to issue this contradiction in view of the injury that is likely to be caused to the export trade in potatoes by the publication of misleading statements of the kind mentioned.

Demonstrations of Pneumatic Tyres for Tractors

THE problem of adhesion of tractor wheels is one that has occupied the attention of agricultural engineers since the internal combustion engine was first adapted for purposes of farm traction. Numerous methods have been adopted in the attempt to make a larger proportion of the horse power available at the drawbar and to decrease the power consumed in the actual moving of the tractor itself.

One method has been the modification of the type of wheel with its equipment of strakes and spuds designed to give a better grip. Along another line, the development of

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the creeper track has been an evidence of the universal desire to solve the problem.

Quite recently an adaptation of the pneumatic tyre has been applied for the purpose. A great deal of publicity has already been given to work in this direction, more especially in America. In this country there are two makes of tyre that can be used with the agricultural tractor—the Dunlop and the Firestone. A great deal of interest was shown in the equipment provided by the Dunlop Company and exhibited at the Royal Agricultural Society's Show at Derby, and the tyres have since been demonstrated at Sutton Coldfield, while those made by the Firestone Company were recently demonstrated on an Allis-Chalmers tractor at Wellingore in Lincolnshire.

Although the types of tread vary somewhat in design, the general make-up of the special low-pressure tyres for farm tractors is not widely divergent. In the Dunlop equipment, the tread of the rear tyre consists of what are virtually large rubber "strakes" with a stiffening rib running around the circumference of the tyre in the centre. It is claimed that the real adhesion of the tyre comes, however, not from the gripping action of the "strakes," but from the suction exerted by the large-section low-pressure tyres when the weight of the heavy wheel and the tractor itself is applied: a set of weights that bolt on to the wheel is supplied for the purpose of giving increased adhesion when required. Cleats are also available for use if exceptionally wet or waterlogged going should be experienced. These are made in two pieces for each wheel and bolt on to the rim in such a manner that the cleat half covers the tread of the tyre and partly protrudes beyond the wheel rim. The front tyre is treaded with three large ribs that encircle the circumference of the cover, and are claimed to lighten the steering of the tractor. The special wheels carrying the tyres are of cast steel, and the weight of each rear wheel complete with tyre and tube (as supplied for the Fordson tractor) is approximately 460 lb., which is considerably heavier than the weight of the ordinary iron wheel.

The demonstration of the Dunlop pneumatic tractor tyres at Sutton Coldfield was carried out with Fordson tractors on soil that appeared to be a sandy loam, containing many rounded stones, over a stronger subsoil: the demonstration field was cropped with rough "seeds" grass. A low-gear tractor experienced no difficulty in pulling first a two-

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furrow and, secondly, a three-furrow plough at a depth of about six inches. In carrying out this work the tractor was in the furrow in the normal way, and attention was drawn to the fact that the new type of wheel did not pack the bottom of the furrow. Another tractor of the standard type was shown first pulling a two-way single-furrow plough at a depth of about 14 inches, the tractor pulling from the land beside the furrow with the plough off-set to the direct line of draught. Later, this machine worked down the ploughed land with an "Elwick" wheel-less cultivating attachment using nine tines. Over this very loose soil no signs of wheel slip were apparent either at the moment of the tines entering the ground or at full working depth. Following the cultivating, three ridging breasts were put on the attachment, and ridges opened at a depth suitable for potato setting; the tractor then returned over its work splitting the ridges and covering in.

Under the conditions prevailing at the time of this demonstration, the Dunlop equipment was undoubtedly satisfactory. The adhesion shown when a cultivator was taken over the deeply-ploughed land was unusually good, and the wheel track left after the deep ploughing with an off-set implement was barely noticeable.

In dealing with the demonstration of the Dunlop tyres, mention may be made of the demonstration of Allis-Chalmers tractors of the creeper and wheel types recently arranged at Wellingore, Lincolnshire, at which the Firestone equipment was shown. This demonstration was carried out on the strongest type of heavy clay prevalent in the Wellingore vale, ploughing and cultivating being done on clover leys and summer fallows. In comparison with the iron wheels, the low-pressure tyres were found to be of most advantage in cultivating on fallows, increased speed and reduction in pressure on the broken-up land resulting from their use.

At the time when both these demonstrations were carried out, the land was in a very dry condition, and it will be interesting to have further experience of the work of these tyres on soil that is either waterlogged or very wet. It may be added that, while the experience gained in the use of agricultural tractors equipped with pneumatic tyres is for the moment very limited, it would seem that the coming of this equipment may have a marked effect upon tractor design. It is definitely an adaptation that provides further

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advantages for the farmer, and a step forward in the development of mechanization of farming.

World's Grain Exhibition and Conference

THE World's Grain Exhibition and Conference held at Regina, Canada, from July 24 to August 5, attracted over 200,000 visitors. The proceedings were opened by the Hon. Robert Weir, Minister of Agriculture for Canada, supported by the Rt. Hon. Arthur Meighen, Leader of the Senate, Ottawa, and the Rt. Hon. W. L. Mackenzie King. Sir A. D. Hall, F.R.S., Sir E. J. Russell, F.R.S., and Mr. William Robb attended on behalf of His Majesty's Government, whilst amongst others from this country were Sir Albert Humphries and Lieut.-Col. C. Waley Cohen. Representatives from other participating countries were also present, and included officials from Australia, Belgium, France, Guatemala, Hungary, India, Mexico, Netherlands, New Zealand, Poland, Siam, South Africa, Spain, and the United States of America.

The exhibition side was divided into two sections—(1) national exhibits of an educational type, and (2) competitive exhibits in cereal, flax and seed classes.

The Canadian Department of Agriculture staged an extensive research and educational exhibit, whilst the provincial Governments displayed exhibits of a more popular kind. The Board of Grain Commissioners for Canada provided a striking exhibit showing flour tests and analyses. The exhibit put up by Rothamsted Experimental Station received considerable attention, and Sir John Russell addressed a large audience on the work of the Station.

The competitive grain exhibits attracted much popular attention. It is interesting to record that growers from England and Scotland gained awards in the classes for oats and barley open to growers from all over the world, whilst the Ministry of Agriculture for Northern Ireland secured first prize in the class for flax seed for fibre.

The Conference included Open Sessions, chiefly occupied in discussion of the general wheat situation, and the Convention Meetings of the Canadian Society of Technical Agriculturists, which embraces all officers engaged in education and research in the Dominion. The quality of the papers and discussions was high and was evidence of the rapid growth of agricultural research in Canada. No

resolutions were adopted, but a complete outline of the proceedings, including the papers read and the discussions, will be available later.

The Conference was closed officially on August 4 by His Excellency the Governor-General of Canada, the Earl of Bessborough, P.C., G.C.M.G.

Apples should be Picked with their Stalks

THE following note has been communicated by Dr. H. Wormald, of the East Malling Research Station, Kent:—

In September, 1927, a description was given in this JOURNAL (Vol. XXXIV, p. 552) of brown rot on apples that had been picked without stalks, the infection having started at the wound left at the stalk end. The fruit had not been packed at the time the rot was observed, so that it was possible to reject the affected apples.

Until last year, no serious damage to marketed apples had been reported. In August, 1932, however, one grower experienced considerable loss from sending to market a consignment of apples that included many without stalks. They had been sent off within three days of picking, and, although they were apparently sound, many must have been already infected, for on the day after their arrival brown rot was very noticeable. The grower was informed of this, and in consequence visited the market and brought away samples of the infected fruit. These were examined by the writer the next day; all the rotting apples were without stalks and the brown rot fungus had entered at the stalk end.

Apples infected in the same way have been seen this year also, but only on fruit that had not been packed.

It is evident that the damage in such instances is a result of carelessness in picking or of ignorance regarding the importance of retaining the stalks on picked fruit. It is advisable that new or inexperienced workers employed for gathering fruit should be informed that fruit picked without stalks, even though otherwise sound, must be regarded as damaged, and precautions to obviate such damage must be taken.

It is probable that in some instances the fruit is deliberately pulled away from its stalk. Thus, one correspondent wrote this year with reference to picking fruit with stalks attached: "It may be very easy when the fruit is quite

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ripe, but when it is not I have always twisted the stalk until it came out of the fruit, and it is probable that it is for this reason that many of my apples have developed brown rot after being stored"! From the observations recorded above it is obvious that to resort to such measures is to run great risk of losing much of the fruit, particularly if it is to be stored or sent to market. Apples picked without stalks should be used immediately.

National Rat Week, November 6-11, 1933

THIS year's "Rat Week" will commence on Monday, November 6, and the Ministry desires again to stress the need for a special effort during that week to ensure concerted action in destroying rats and mice. If maximum results are to be obtained, it will be necessary to secure the wholehearted co-operation and support of local authorities and the general public.

It is hoped that all or any of the following suggestions will be adopted as far as possible, and that any other procedure that may be specially suitable for any particular locality will be employed:—

(1) Special attention should be given to any source of infestation on properties owned by local authorities, such as rubbish tips, sewage farms, etc.

(2) Treatment of sewers under the control of local authorities should be systematically carried out.

(3) Premises that are peculiarly subject to infestation by reason of the nature of the business carried on therein might receive special attention.

(4) Local chemists and hardware dealers are invited to stock and advertise extra quantities of suitable baits and appliances for killing rats and mice.

(5) Suitably worded lantern slides might be prepared and be exhibited by arrangement at local cinemas.

(6) Proprietors of local cinemas might be very helpful if they would exhibit the Ministry's cinematograph film on the destruction of rats. A memorandum as to conditions of loan or purchase, and form of application, may be obtained from the Ministry. Early application is advised and alternative dates should be given, in view of the great demand for the film. It can be shown with advantage at any time during October, or during the two months after Rat Week.

(7) The Ministry's lecture "The Story of the Rat" (illustrated by lantern slides) might be given at local halls or other suitable places. A memorandum as to conditions of loan may be obtained from the Ministry.

(8) In county areas where powers under the Act have not been delegated to the minor local authorities, efforts might be made to secure the co-operation of those authorities so as to ensure, as far as possible, a thoroughly efficient campaign throughout the country.

(9) The local press can do much to stimulate interest in the subject and induce their readers to take action.

(10) Posters may set out the objects of the campaign, and call the attention of the public to their responsibilities under the Rats and Mice Destruction Act, 1919.

(11) Handbills may be distributed in public places and through the agency of public libraries. The governing bodies of schools and other educational institutions might usefully call the attention of students to the importance of rat destruction.

(12) A pamphlet giving the names of firms prepared to supply materials for rat destruction, and also containing some simple suggestions for rat destruction, may be obtained from the Ministry, together with a copy of Advisory Leaflet No. 49, "The Destruction of Rats and Mice."

(13) Bulletin No. 30, "Rats and How to Exterminate Them," is much more comprehensive than Advisory Leaflet No. 49, and copies may be obtained from His Majesty's Stationery Office, Kingsway, London, W.C.2, or through any bookseller, price 6d. (7d. post free).

It may be added that the Ministry is ready at any time to give all the assistance and advice in its power where any instance of rat infestation presents features of special difficulty.

Testing Agricultural Machinery

THE regulations governing the Ministry's scheme of tests of agricultural implements and machines have recently been revised with the object of making the scheme of greater service to the interests concerned. The revised regulations are embodied in an explanatory pamphlet that is now available for distribution; copies can be obtained free of charge on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

As in the past, a certificate and report on each test will be issued; the certificate will state the bare facts of the test, whilst the report, in addition to giving the details of the test and the results obtained, may contain expressions of opinion with regard to the design and performance of the machine. Both certificate and report will be published by the Ministry in one pamphlet, and either or both may be reprinted if desired.

Careful consideration has also been given to the subject of confidential tests of implements or machines that are not yet on the market. Previously, the scheme provided for such tests and for reports thereon to be given to the applicant only. It has now been decided that it is preferable that tests of this nature should be carried out by suitable research institutes rather than under the ægis of the Committee; in future, therefore, manufacturers should apply

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direct to the appropriate research institute. Any further information will be gladly supplied by the Ministry.

Sampling for Seed Testing

APART from the requirements laid down by the Seeds Act, 1920, as regards the testing of seeds, it is becoming increasingly general for farmers to obtain from the Official Seed Testing Station, Cambridge, reports upon samples of seed which they are proposing to sow. As an analysis can only show the quality of the sample submitted for test it is clearly very important that any such sample should accurately represent the bulk of the seed from which it was drawn.

The following precautions, based on the requirements of the Seeds Regulations, 1922, should be taken to ensure as great a degree of accuracy as possible in the drawing of samples. Where the bulk is believed to vary in quality even greater care is necessary.

Manner of Storage: Precautions in Sampling.

1. Small lots stored in drawers Thoroughly mix by hand in the drawer.
2. In a small bag or part of a sack Thoroughly mix by hand, either in the bag or after shooting the seed on to a clean floor.
3. A full sack Take samples from the top, middle and bottom of the sack. If the seed is small, e.g., clover seed, a metal seed spear may be used to penetrate the sack, and this will allow seed to be drawn from the different parts without difficulty. If the seed is not suitable for spearing it may be necessary to have part of the contents shot into another bag to enable the lower portions of the sack to be reached.
4. A number of full sacks Up to five sacks, sample every sack; over five and up to 50 sacks, portions need only be taken from one sack in five with a minimum of five sacks; over 50 sacks, from one sack in ten with a minimum of ten sacks.
5. Seed in heaps or bins The sample must be obtained by taking portions from various parts of the heap or bin, and mixing them together. It is desirable to take portions from different depths in the heap as it is not sufficient to collect small handfuls from the surface.

In the three cases above, Nos. 3, 4 and 5, the bulk sample drawn will probably be larger than the test sample required for analysis. The portions that make up the bulk sample should therefore be put together into a clean receptacle, e.g., a seed scoop or a small measure, and thoroughly mixed. The sample for analysis, taken from this mixture, must be as representative of the bulk sample as the bulk sample is of the original bulk.

Sampling from a Seed Dressing or Cleaning Machine.—A sample is deemed to be correctly drawn if it is obtained

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from various parts of the seed whilst passing from the machine. In practice this can be adequately done by having a receptacle standing near the spouts of the machine, and putting a handful or so into it each time the feeding sack is changed. Here also, it is necessary thoroughly to mix the seed so obtained before drawing the sample.

General.—Where the seed is stored in sacks, and the light in the store is good, it is comparatively easy to detect if the seed from any one sack is different in quality from that of the others. If, however, the light is poor, it may be desirable to take the portions from each sack to a window for comparison before mixing them together. Unevenness of quality in a bulk may occur through a number of causes, but it can be considerably reduced if, after threshing, all seed or corn is shot on to a barn floor and well mixed before sacking. If the bulk is not properly mixed before being sacked, variations may be due to the following causes: (*a*) the first few sacks threshed having been contaminated with seed that remained in the threshing drum from the previous threshing, (*b*) the first few sheaves from the top of the stack being weathered, or the top consisting of rakings, (*c*) over-heating in the stack, or (*d*) differences in the performance of the threshing machine.

It is equally important that the farmer should ensure that all seed or grain is thoroughly mixed after threshing, and that the person who draws a sample should do so as thoroughly as is here suggested. It may also be desirable that a duplicate of the sample sent for testing should be retained by the sender.

NOTE.—Regulation 5 of the Seeds Regulations, 1922, specifies the required weights of samples of seed for testing as follows:—

Garden swede, garden turnip, garden cabbage, garden kale, garden kohlrabi, brussels sprouts, broccoli, cauliflower, carrot, par- snip, onion	Not less than $\frac{1}{4}$ oz.
Wild white clover	Not less than 1 oz.
Rye-grasses, meadow fescue, cocksfoot, crested dogtail, timothy, alsike clover, white clover (other than wild), field turnip, swede, rape, field cabbage, field kale, field kohlrabi, mangel, beet, and sugar-beet	Not less than 2 oz.
Wheat, oats, barley, rye, tares or vetches, red clover, crimson clover, trefoil, lucerne, sain- foin, flax, linseed and mixtures of grasses and clovers	Not less than 4 oz.
Peas (field and garden), beans (tick and winter), dwarf beans	Not less than 4 oz.
Broad beans, runner beans	Not less than 8 oz.
Menzies or Sitka spruce	Not less than 1 oz.

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Hemlock spruce, red or canoe cedar Not less than $\frac{1}{2}$ oz.
All other kinds of forest tree seeds Not less than 2 oz.

Sealed packets of seeds. Such number of unbroken packets as together contain the minimum weight above prescribed, but not exceeding three unbroken packets.

Information concerning the dispatch of samples to the Official Seed Testing Station and the fees for testing is given in Form 728/C.S., obtainable from the Ministry.

Wheat Precision Observations

THE following is a summary of the third quarter's observations on wheat crops sown in the autumn of 1932 under the scheme described in the March (1933) issue of this JOURNAL. Short accounts of the observations during the first and second quarters will be found in the March and June issues respectively.

The sampling observations from March to June make it possible to specify three dates of phenological interest, and to specify the state of the crop at each date.

(i) Shoot number or density increases rapidly during the tillering period, but usually suffers a sharp decline at the beginning of the period of rapid growth in height. Consequently, a date can be fixed at which the shoot number is at its greatest. This will generally be well determined from four fortnightly counts. The dates range from early March for the two standard varieties at Seale-Hayne, to May 11 for Yeoman at Newport. The late dates for Victor at Seale-Hayne and for both varieties at Newport are associated with very low plant density, as shown in the report for the second quarter. The shortest interval between tillering and maximum shoot number, 27-28 days, occurred with the dense crop at Boghall. At Wye a second and higher maximum shoot number occurred early in May.

(ii) The date of maximum growth rate in height of the shoot varied only from May 20 (at Woburn) to June 4 (at Boghall). Variation within this range of 15 days seems little influenced by sowing date. The shoots are about 40 cm. high, and grow usually more than 2 cm. a day. Shoot density has been very largely equalized at the different stations, in spite of the large variation in plant number, and in shoot number at the maximum. Yeoman regularly shows a higher density than Squarehead's Master.

(iii) The date most precisely fixed is that of ear emergence, which follows somewhat regularly two to three weeks after that of maximum growth rate. Ear

SAMPLING OBSERVATIONS ON WHEAT, 1932-33, THIRD QUARTER

Station	Variety	Maximum Shoot Density			Maximum Growth Rate			Ear Emergence				
		Date	Shoot Density per 32m.	Shoot height cm.	Date	Rate cm. per day	Shoot Density per 32m.	Shoot height cm.	Date	Rate % per day	Shoot Density per 32m.	Shoot height cm.
WOBURN, Bedfordshire	Squarehead's Master Yeoman	April 3.28	4054	—	May 20.22	2.32	2659	46.70	—	—	—	—
		April 5.28	4721	—	May 20.84	2.02	2884	40.87	—	—	—	—
SEALE- HAYNE, Devonshire	Squarehead's Master Yeoman Victor	Mar. 2.12	4297	1.63	May 27.84	2.10	2076	48.39	June 9.74	15.1	1916	71.21
		Mar. 2.71	5375	1.20	May 29.30	2.26	2416	39.45	June 9.22	20.4	2216	58.89
ROTHAM- STED, Hertfordshire	Squarehead's Master† Yeoman ‡ Victor ‡	Apr. 20.56	2324	7.39	May 29.20	2.26	1427	46.15	June 11.22	13.8	1226	76.34
		Apr. 6.73	4374	2.81	May 27.92	1.82	2114	40.93	June 13.56	9.8	1552	69.31
WYE, Kent	Squarehead's Master* " * Yeoman * "	Apr. 2.40	5660	1.27	May 28.99	1.68	2476	33.34	June 14.41	15.3	1770	59.57
		Apr. 10.15	4065	3.19	May 29.54	1.82	1932	38.99	June 14.35	12.4	1440	66.82
NEWPORT, Shropshire	Squarehead's Master* " * Yeoman * "	Apr. 1.92	2965	2.47	—	—	—	—	June 11.09	9.8	1896	—
		May 4.35	2979	11.90	—	—	—	—	June 12.78	17.2	1650	—
BOGHALL, Edinburgh	Squarehead's Master† Yeoman †	Apr. 12.22	3224	2.79	—	—	—	—	—	—	—	—
		May 4.08	3751	7.76	—	—	—	—	—	—	—	—
SPROWSTON, Norfolk	Squarehead's Master† Yeoman †	Apr. 30.84	2755	—	May 28.36	2.40	2120	47.47	June 14.90	15.7	1482	83.38
		May 10.99	2605	12.90	May 29.18	2.09	2352	40.42	June 17.27	10.5	1482	73.09
LONG SUTTON, Hampshire	Squarehead's Master Yeoman Wilhelmina	Apr. 23.11	5092	—	June 3.55	2.27	2356	51.03	June 23.91	22.4	1864	88.70
		Apr. 25.60	5383	—	June 4.01	2.02	2521	46.15	June 24.08	22.4	2087	78.73
SPROWSTON, Norfolk	Squarehead's Master Yeoman	Apr. 26.24	3211	3.81	June 3.15	2.37	1815	44.63	June 18.43	14.6	1693	77.80
		Apr. 28.55	4129	3.06	June 3.75	2.11	2254	36.96	June 20.33	10.5	1904	66.71
LONG SUTTON, Hampshire	Squarehead's Master Yeoman Wilhelmina	Apr. 26.25	4244	2.98	May 31.34	2.70	2630	41.76	June 15.11	15.5	1581	73.93
		Apr. 25.38	5176	2.82	May 29.26	2.70	3292	36.27	June 15.25	15.3	1999	64.21
LONG SUTTON, Hampshire	Squarehead's Master Yeoman Wilhelmina	Apr. 25.46	4541	2.96	May 30.02	2.68	2969	36.14	June 17.31	22.7	1895	62.66

* Based on samples of three instead of four rows. † Based on five instead of eight blocks. ‡ Based on seven instead of eight blocks. § Based on samples of eight blocks, from May 20.

Certain values (indicated by blanks in the table) could not be determined because the observations at the stations in question were incomplete.

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emergence occurs relatively suddenly, at a rate sometimes exceeding 20 per cent. a day. Consequently, an interval of two days between observations would probably be better than three. Shoot height at this stage differs considerably from place to place, but it will be noted that the difference between Squarehead's Master and Yeoman is remarkably constant.

Cereals for Autumn Sowing

THE following note has been communicated by the Director of the National Institute of Agricultural Botany:—

The Wheat Act, the understanding with the brewers, and the higher import duty on oats, together make the prospects of cereal growing less disheartening than they have been for some time past. Full advantage of better prices can only be taken by farmers who choose the best varieties. Wheat growers above all need to consider the question of variety, and many farmers might, with advantage, sow an improved type of seed this year.

Fortunately the trials organized by the National Institute of Agricultural Botany can give farmers in the Midlands, east and south of England very useful direction, whether the crop be wheat, oats or barley. It will pay farmers best if they make their choice of wheats from the varieties Victor, Wilhelmina, Yeoman, Yeoman II, Little Joss, Iron III, Weibull's Standard, Rivett and Squarehead's Master. For barley there are three alternatives—the ordinary six-row for exposed situations, and Plumage-Archer or Spratt-Archer for sheltered fields and well-drained soils in the south. Winter oats are a more difficult problem; there is no entirely satisfactory variety, for though Grey Winter, and in slightly lesser degree, Black Winter, can be relied on to survive the winter and give a good yield, they almost always lodge on the richer soils. Bountiful stands better, but is often damaged by frost, and, since the hard winter of 1929, true stocks are difficult to find. Unique is a white oat, with occasional grey grains in it, that behaves in much the same way as Grey Winter, except that it has a thicker husk. The use of the term "White Winter" as a varietal name should be avoided, as it is ambiguous.

Brief particulars of the purposes for which these varieties are adapted are given in Farmers' Leaflet No. 1, issued by

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the National Institute of Agricultural Botany. Copies of the leaflet can be obtained free of charge from the Institute at Cambridge or from any County Agricultural Organizer, and inquiries about these or other varieties are always welcome.

The Maynard-Ganga Ram Prize

IN 1925 the late Sir Ganga Ram, Kt., C.I.E., M.V.O., R.B., Lahore, with that generosity for which he was so well known, handed over to the Punjab Government a sum of Rs. 25,000 for the endowment of a prize of the value of Rs. 3,000, to be called the Maynard-Ganga Ram Prize and to be awarded every three years, for a discovery, or an invention, or a new practical method, that will tend to increase agricultural production in the Punjab on a paying basis. The competition is open to all throughout the world. Government servants are also eligible to compete for it.

Entries for the next award were invited by December 31, 1932. As the response was poor, it was decided by the Managing Committee of the prize that the award should be postponed for another year. Further entries should accordingly reach the Director of Agriculture, Punjab, Lahore, on or before December 31, 1933.

Turkeys

TURKEY rearing is often regarded as a rather more hazardous business than the rearing of other poultry, but if careful methods are adopted it can show a satisfactory profit. Considerable numbers of birds are still imported annually, and it seems desirable that greater efforts should be made by producers in this country to meet the demands of the home market, especially as there is now a 10 per cent. *ad valorem* duty on imported foreign turkeys. Efficient methods in both production and marketing are essential, however, and the Ministry has recently prepared a Bulletin* to provide guidance in these matters.

The Bulletin describes turkey management as practised on many general farms in the country, more particularly in Norfolk, and concludes with a section on intensive rearing, a system that at present claims considerable attention where only a limited amount of land is available.

* Bulletin No. 67. *Turkeys*. Obtainable from H.M. Stationery Office, price 6d. (by post 7d.), or through any bookseller.

SOIL CONDITIONS ASSOCIATED WITH CROP FAILURES IN DEVON AND CORNWALL

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THE following observations on crop failures in the south-west of England are the outcome of analytical data obtained from more than two thousand samples of soil collected during the past three or four years. The figures presented, together with the notes on the crop obtained, should be of interest both to the soil chemist and (perhaps more so) to the actual grower. In all probability, the soil and climatic conditions in this area differ to some extent from those in other parts of the country, but it is felt that the information obtained from these studies would be found on investigation to be equally applicable (at any rate) to intensively cultivated gardens in other areas.

Types of Soil.—Whereas a soil map of Devon and Cornwall, based on the modern method of classification, displaying type of parent rock, colour of soil, topography, etc., would show differences almost from field to field, a similar map, showing soil texture only, would be uniform over hundreds of square miles without a break. Medium loams predominate over more than 50 per cent. of the area, and most of the other half could be classed as sandy, light and heavy loams. Light, sandy soils on the one hand, and heavy clays on the other, are difficult to find except in one or two well-defined localities, and there is nothing corresponding to the Oxford or London clay soils of the Eastern Counties. At the same time, the subsoils over very large areas are of a clayey nature, though drainage is facilitated by the admixture of shale brash. Typical market-garden light, sandy soils are found only in east Devon in the neighbourhood of Exeter, and in the south-west of Cornwall.

The colour varies from black on the granite areas to the deepest blood-red. Perhaps the most highly-coloured in the latter class of soils is to be found in the very deep subsoils overlying the chloritic and mica-schist formations in the extreme south of Devon. The depth of soil to the parent rock varies of course with the topography, but usually on

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the hill slopes does not exceed 3 ft. Denudation on these slopes, assisted by the activities of rabbits, moles, etc., is also naturally substantial.

Climate.—The high, mean annual rainfall of the area needs no emphasis: 40 in. of rain at least are general except, perhaps, in a small part of east Devon; and on the more elevated parts this rises rapidly to round about 90 in. at Princetown and other places. Figures of 10 to 12 in. for one of the winter months at Seale-Hayne College are not unknown. As regards temperature, the important point, relevant to this article, is the fact that, whereas the average mean temperature during the winter is high as compared with the rest of the country, the summer figures are relatively low.

The above brief account of the soil and climate may convey some idea of the peculiar conditions of this district, and to a certain extent, perhaps, provide some explanation of the abnormal features of the former from a chemical point of view.

Humus and Nitrification.—For instance, the "humus" content of the soils shows a rough correlation with the rainfall. The loss on ignition figure, which may be taken as an index of this, varies from 28 per cent. for a peaty soil (not pure peat) on the edge of Dartmoor to 3 per cent. in east Devon. Similar figures for south Devon and east Cornwall are about 8-10 per cent., north-west Devon 14-16 per cent., and west Cornwall 10-12 per cent. It is appreciated that this is not a full explanation, and that other factors enter into the argument. The figures given are intended rather to give some conception of the richness of these soils in organic matter, and to illustrate that in this respect they equal and in many localities surpass the black earths of Russia. The soils termed, by Glinka, the Fat or Massive Tschernosem of the southern latitudes, are quoted by him as giving loss on ignition figures of round about 20 per cent., and those of the northern latitudes of round about 16 per cent. The comparison fails when referred to depth of soil in corresponding horizons, the Russian black earths being many times deeper than these English soils.

Another rather outstanding feature of these soils is the apparent high rate of nitrification. Under ordinary natural conditions, the nitrate nitrogen content appears to be roughly related to the amount of humus present, and it is

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only in cases of extreme acidity or phosphate deficiency that this process is in any way affected. Soils taken from the very poor pastures of Dartmoor, where the pH figures fall below 4.5, are practically deficient in nitrate nitrogen, even in summer, but nearly always contain fair traces of nitrite nitrogen. The quantity present at any time varies considerably with the previous manuring, and with the extent of the rainfall of the preceding few days; but figures of 20, 30 and even 40 parts per million on unmanured soil are not uncommon during the early summer and autumn months. Even during the winter, average figures of 10 or more are very common on ordinary arable fields. To the relatively large amount of nitrate nitrogen actually present in these soils at any time, must be added that which is being continuously leached out by the heavy rains, especially during the winter months. Some idea of this quantity may be obtained from a determination made on water taken from small streams fed from surface drainage, etc.:—

Stream water,	4.0	parts	nitrate	N.	per	million
River ,,	2.3	,,	,,	,,	,,	,,
Torquay reservoir,	4.5	,,	,,	,,	,,	,,

In the matter of other constituents of soils, usually regarded as significant from the point of view of crop growth, general statements differentiating these from other soils cannot be made. There is just as much variation from place to place, or, for that matter, often from field to field, as elsewhere. In fact, for reasons indicated above, the variation in Devon and Cornwall is probably more pronounced.

Soil Acidity.—Instances of failure, apparently due to excessive soil acidity or calcium deficiency, can be seen in all parts of the two counties. Cornwall has a reputation for sour soils—lime deficiency is its soil problem *par excellence*—and the very existence of certain crops, such as Cornish Marl Clover and Cornish Eaver,* is due simply to their ability to tolerate these conditions. Fortunately, for a district where agriculture and horticulture are of prime importance, an abundant supply of carbonate of lime is available in the sea sand round the greater part of the coast line: but for this, it is certain that many thousands of acres would have lain derelict for centuries. In the inten-

* A local indigenous type of perennial rye-grass.

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sively-cultivated areas and other places within easy reach of the main sand supplies, the soils over hundreds of acres contain up to 30 per cent. of carbonate of lime. As it is quite certain that at some time these soils contained no calcareous material, and that the idea of sand being transported by wind or otherwise is untenable, it could reasonably be calculated that at least 50 per cent. of this land to a depth of 5 or 6 inches or more has been carried up from the sea shore. The soil reaction in these cases is of course decidedly alkaline, pH figures of 8.5 being common, while some are higher still.

The reclamation of derelict heath-land by the use of sea sand or lime, such as that carried out on the Newlyn Downs in mid-Cornwall, is spectacular indeed. Magnificent crops of corn, seeds or roots in the middle of a large heather-covered waste provide a real object-lesson on the value of calcium, if ever there was one. Yet, to this day, it is strange that the most southerly district in the British Isles is a wilderness of low moor vegetation through lack of lime alone.

Instances of extreme acidity on cultivated land, resulting in practically total failure, are fairly common; and, on many thousands of acres, certain crops are not grown at all for this reason. In short, the lime status of the soil is by far the greatest single limiting factor determining the distribution of ordinary agricultural crops, and in large areas there is a slow, almost imperceptible deteriorating influence on these crops.

Phosphate Deficiency.—After a hundred years of artificial phosphate fertilizers, phosphate deficiency is still an important cause of crop failure. This is in the main associated with the more acid soils, and is most pronounced in certain fairly well-defined districts, such as mid and west Devon, and many parts of Cornwall. For reasons to be explained below, the writer prefers to use the term “phosphate level” and to designate the type of soil in question as being low in this respect. The term “crop failure” is also somewhat of a misnomer. The crops are usually small and poor in quality, and necessitate special care and trouble in matters of cultivation, etc. A large proportion of this land, moreover, is laid down to permanent grass and is usually referred to as poor pasture.

The crop results apparently determined by the “potash

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level " of the soil are very interesting indeed. The variations in the analytical figures are not nearly so great as with phosphate, but productive capacity and response to potash fertilizers show a striking correlation with these figures, with almost all crops, in many well-defined localities.

Soil Balance.—More remarkable still, however, is the agreement between fertility in its broadest sense and analytical figures, when the latter are considered relatively amongst themselves and not absolutely. In other words, an accurate valuation of a soil can be made by a careful estimation of the *balance* of at least four of the analytical figures, namely calcium, phosphate, potash and nitrate nitrogen. Probably other data could be added to this list, but these suffice for the purpose of this paper.

The calcium status is given by the pH figure, the phosphate level by the P_2O_5 soluble in strong HCl and that fraction soluble in 1 per cent. citric acid, and the potash level by the amount in the exchangeable form. The nitrate nitrogen is a definite fraction. It is clearly recognized that some of these are conventional, but they do represent something of consequence.

Expressed as parts per million, the extreme variations in over two thousand samples of soil actually being utilized for outside cropping are:—

pH figure	.. ..	3.9 to 8.9
" Total " P_2O_5	.. ..	310.0 to 10410.0
" Available " P_2O_5	.. ..	12.0 to 5200.0
Exchangeable potash	.. ..	36.0 to 1190.0

The procedure adopted with cases of crop failure is as follows:—if the failure is confined to a part of a field, two samples are taken, one from the worst and one from the best patch. When a whole field is involved, a " good " sample is taken from the nearest field actually growing the same crop on a similar " type " of soil, or one where such crops normally do well. In all cases, differences due to climatic conditions are eliminated, and every effort is made to eliminate also such external factors as slope, moisture, depth and type of soil, variety of crop, etc.

A single sample will illustrate the argument in one of its simplest forms:—

		Loss on	Total	Avail-	Exchange-	Free	Nitrate
	pH	Ignition	P_2O_5	able	able	$CaCO_3$	N.
			p.p.m.	p.p.m.	p.p.m.		p.p.m.
Good	.. 6.41	9.52	3220	690	203	nil	3.4
Bad	.. 6.72	8.15	3740	1150	124	nil	3.6

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These figures refer to an arable field near Falmouth, which by reason of its position is fertilized only with "artificial." The crop in question was dredge corn, which failed almost completely in one part of the field. Here the lowest potash figure on the "bad" portion is associated with the higher phosphate level.

The ratio, available phosphate/available potash, is approximately 3 and 9 in the two cases respectively. It has been observed, from a study of some hundreds of such cases, that when the ratio approaches 10, the conditions for many crops are adverse, and trouble in one form or another is encountered.

It should also be borne in mind that an important feature of many of these cases is that, in nearly all of them, manuring with both dung and artificials is not by any means neglected. If anything, manuring is on the heavy side, and the failure is in a sense a sequel of manuring rather than in spite of it.

The number of instances almost identical with the above can now be counted by the score, but the number on "simple" samples (i.e., "bad" only) amount to several hundreds. In fact, about 75 per cent. of all samples, received from gardens or intensively cultivated fields, come within the category of "very-high phosphate level" soils. The proof that a correct diagnosis has been made is being continually furnished from numberless quarters where the all-round improvement effected by (1) stopping phosphate altogether, and (2) balancing up the high phosphate level with heavy dressings of potash is being slowly but surely demonstrated.

Two such examples may be quoted:—

	<i>pH</i>	<i>Loss on Ignition per cent.</i>	<i>Total Nitrogen per cent.</i>	<i>Total P₂O₅ p.p.m.</i>	<i>Citric sol. P₂O₅ p.p.m.</i>	<i>Exchange- able. K₂O p.p.m.</i>
A	4.88	13.93	0.496	6930	2530	104
B	4.95	13.04	0.456	7660	2640	295

Both soils were taken from a typical Tamar Valley garden. The crops associated with A—daffodils; strawberries and turnips—were all dying off, small and infected with disease. B was taken from a gooseberry plantation where the bushes were unhealthy and the yield most unsatisfactory. Heavy dressings of potash alone resulted in an all-round improvement on A and a bumper yield on B in 1932, which was regarded as a "poor year" for gooseberries.

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The second illustration refers to ordinary farm land, the two samples being from adjacent fields:—

	<i>pH</i>	<i>Loss on Ignition per cent.</i>	<i>Total P₂O₅ p.p.m.</i>	<i>Citric sol. P₂O₅ p.p.m.</i>	<i>Exchangeable K₂O p.p.m.</i>
C	5.71	12.82	5970	1870	168
D	5.14	15.71	5280	720	96

Sample C was taken in May, 1929, when a barley nurse-crop and "seeds" were both dying off. The "seeds" failed completely, and, in the following February, 6 cwt. per acre of potash salts and 1 cwt. per acre of nitrate of soda were applied, and the field was reseeded with complete success.

D represents the type of soil on the adjoining field where no such failure had ever been encountered.

It will be noticed that the actual potash level in C is higher than in D. This same phenomenon is very common indeed. Severe instances of "leaf scorch" and other indications of potash deficiency are more often than not associated with a high potash level masked as it were by an excessively high phosphate level.

The explanation of the high phosphate level of so many of the soils in Devon and Cornwall is dependent upon a number of factors. The parent rock in many areas, more especially those of volcanic origin, is rich in phosphates, and much has been added as manure, artificial and otherwise. In addition to this, the writer is inclined to think that long and frequent cultivation, and the presence of organic matter in fair amounts, has, perhaps, indirectly, by bacterial action, converted the phosphate into a more soluble and active form. All the old garden soils examined, without exception, have available phosphate figures of round about 2,000 to 3,000 parts per million. Some of these have probably been cultivated for at least one or two hundred years, but, in some instances, owners of 40 or 50 years' standing state emphatically that no artificial phosphatic fertilizers have been applied.

ROCK ANALYSES.			<i>P₂O₅ per cent.</i>	<i>K₂O per cent.</i>
Partially weathered basalt, Crediton ..	..	..	1.61	10.09
Upper Devonian shale, Newton Abbot ..	..	..	0.27	2.65
Red conglomerate, Mid Devon ..	..	..	0.25	4.15
Diabase, Mid Devon	0.88	0.21
Schalstein, Mid Devon	0.43	1.32
Culm Grit, N.W. Devon	0.19	1.78

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The area covered by the culm grits has already been referred to as one on which the soils are notoriously "deficient in phosphates."

Many orchards in which poultry have been kept for years also come within this list of "high phosphate" soils associated with harmful effects on the fruit trees.

The practical significance of such facts, with the ramifications in all directions, is of course very great in these two counties; but the scientific questions involved are no less important, even in this one aspect of soil science and crop nutrition.

Failure of Farm Crops.—A short account of the crops coming within the purview of this paper, and the nature of the failure, may be of interest. Some crops appear to tolerate a very wide range of soil conditions, while others are much more susceptible to a state of unbalance.

With corn, a relatively low potash level results in long weak straw and "laid" corn, especially after "seeds" or in a wet year, or attack by fungoid diseases such as *Helminthosporium*. Of the root crops, mangolds is particularly sensitive. Sometimes the "roots" are small in size and worthless; in other instances the small plants are killed off wholesale by "blackleg." The spread of this disease in the south-west is undoubtedly associated with a high phosphate and a relatively low potash level in soils of an acid type.

A number of cases of failure of seeds, similar to the example mentioned above, have been recorded. The facts and data relative to a field near Penzance are particularly interesting in this connexion.

During the past ten years, no really satisfactory crop has been grown. Even broccoli and potatoes have been unsatisfactory, and the 1931 crop of mangolds was prac-

FIELD NEAR PENZANCE.

	pH	Loss on Ignition per cent.	Parts per million of soil				Free CaCO ₃ per cent.
			Total P ₂ O ₅	Avail- able P ₂ O ₅	Exchange- able K ₂ O	Nitrate N	
A	6.76	11.40	2940	1010	230	9.2	0.32
B	6.73	11.23	2750	948	135	9.2	0.56
C	6.54	8.62	2740	370	183	5.8	nil

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tically valueless. A seeds mixture, sown in 1932, had failed in patches over more than two-thirds of the field. Two composite samples of soil were taken in March, 1933, A representing that where the grasses and clovers were established, B representing the bare patches. C is a field about two hundred yards away on the same farm where good crops of all descriptions are grown without trouble.

Broccoli, one of the most important crops in Cornwall, and one of the most tolerant of wide ranges of soil conditions, is now showing signs of deterioration in one or two places. "Good" and "poor" patches on a typical field at Gulval are as follows:—

	pH	Loss on Ignition per cent.	Parts per million of soil				Free CaCO ₃ per cent.
			Total P ₂ O ₅	Avail- able P ₂ O ₅	Exchange- able K ₂ O	Nitrate N	
Good	5.95	9.50	3210	2600	218	11.8	—
Poor	6.98	7.93	4100	3140	101	11.7	0.49

Fruit Trees.—Many examples of unbalanced soils, associated with failure of fruit trees of practically all kinds, in both cultivated and grass orchards, have been investigated. Severe leaf scorch is general in these instances, with premature defoliation and dropping of fruit. Overwhelming evidence of the ill effects of excessively high phosphate levels in the soil has been obtained in all parts of these two counties, but space does not permit of specific examples.

Market-garden Crops.—Strawberry failure appears to be associated with high-soil phosphate and low potash, though there are undoubtedly other factors not yet understood. Special attention has been given to this problem, and, as a result of examining some hundreds of soils, it is significant that the "worst" soils (i.e., those on which strawberries cannot be grown) are the most unbalanced and the "best" are the least unbalanced. The composition of certain "humus" fractions and stimulation of soil processes involving nitrogen are regarded as of importance, but these may be simply other aspects of these conditions.

Violets (an important crop in a small area in east Devon) are similar to strawberries in this respect. Actual figures of

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two soils from adjacent fields in the violet-growing district may be of interest. A was broken from permanent pasture twelve years ago. The yield, size, and general quality of the violets, which at first were perfect, have shown a gradual deterioration and are now regarded as poor. B is an adjoining pasture field representing in all probability the conditions on A when first ploughed up:—

	pH	Loss on Ignition per cent.	Parts per million of soil				Free CaCO ₃ per cent.
			Total P ₂ O ₅	Avail- able P ₂ O ₅	Exchange- able K ₂ O	Nitrate N	
A	7.21	4.75	2170	1560	80	2.6	0.92
B	5.67	6.20	600	280	90	3.7	—

Anemones, which are grown extensively for winter flowers, failed extensively in west Cornwall during the early spring of this year. Excessively unbalanced soils were found in all the samples examined. The corms and roots were completely rotten, but no fungoid or other disease could be found. Adverse weather conditions probably accentuated the influence of the soil.

Greenhouse Crops.—There is little doubt that modern manuring of greenhouse crops tends to gradual unbalancing of the soil, at any rate in the matter of the particular determinations considered in this paper. In a large number of investigations into crop failures under glass, this feature has been strikingly exemplified as well as a very close correlation between crop and soil balance. Deterioration of tomatoes over a number of years appears to be associated with a rapid increase of "available" phosphate derived from the artificial fertilizers applied every year on the one hand, and a practically stationary level of exchangeable potash, on the other. These phenomena may of course be only symptomatic, but it is obviously an aspect of importance in the matter of so-called "sick soils," especially in the light of the evidence already obtained that heat sterilization has the effect of reversing these processes.

POTATOES AND THE PIG

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IN view of the dearth of information relating to the economic feeding of potatoes to pigs, and of the depressed state of the potato market in the winter of 1929-30, the management of the Harper Adams Experimental Pig Feeding Station decided that a demonstration would be of some value to indicate the lines along which pigs might be utilized to dispose of any surplus that might occur in the future. A trial was therefore arranged at the Station to compare the economic returns obtainable at three different levels of potato feeding. Labour charges were kept as low as possible by the removal of the tubers direct from storage, thereby eliminating costs for riddling, weighing, etc. Four groups of pigs were fattened on similar rations of meals, except that in two groups part of the starchy meals (barley and tapioca meals) were replaced by potatoes, whilst in a third they were entirely substituted for the former. It was hoped to obtain some indication of the highest proportion of potatoes that a pig could consume to yield a satisfactory live-weight gain, which would in turn realize a fair value per ton of potatoes.

The Stock.—Forty store pigs of about three months old (all farrowed on the same day) were purchased from a local farm; they were fairly level throughout, since it was possible to select them from a batch of eighty. They were all sired by the same Middle White boar mated to Large White sows. Primarily this cross is utilized for the pork trade, and a baconer type would have been preferred, but owing to the shortage of all classes of pigs then prevailing there was no option. The pigs were carefully divided into four lots of ten each to obtain evenness in relation to distribution of sex, weight, etc.

Management.—The treatment of the lots was the same throughout the feeding period. All were dosed for internal parasites soon after delivery, and the usual routine methods practised at this Station of weighing, exercise, etc., were carried out (a full description of these may be found in this

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JOURNAL for May, 1932, p. 112). It should be mentioned, however, that after the first three weeks it was found necessary to feed thrice instead of twice daily owing to the great volume of the rations containing potatoes.

Rations.—All lots were fed alike except for the varying replacement of starchy meals by cooked potatoes in Lots II, III and IV, shown below.

Lot I.—All meals.

Lot II.—As Lot I, except that one-third of the starchy meals was replaced by cooked potatoes, at the rate of 4 lb. of potatoes for 1 lb. of meal displaced.

Lot III.—Same as Lot I, except that potatoes were substituted for two-thirds of the starchy foods, at the same rate as in Lot II.

Lot IV.—All starchy foodstuffs entirely replaced by potatoes.

Details of Feeding.

At the start:—	Lot 1 per cent.	Lot 2 per cent.	Lot 3 per cent.	Lot 4 per cent.
Starchy Meals	66	44	22	—
Potatoes	—	22(M.E.)*	44(M.E.)	66(M.E.)
Sharps	22	22	22	22
Extracted Soya Meal ..	10	10	10	10
Minerals (Salt and Lime- stone)	2	2	2	2

At the finish:—	Lot 1	Lot 2	Lot 3	Lot 4
Starchy Meals	78·5	52·5	26	—†
Potatoes	—	26(M.E.)	52·5(M.E.)	78·5(M.E.)
Sharps	15	15	15	15
Soya Meal	5·25	5·25	5·25	5·25
Minerals	1·25	1·25	1·25	1·25

* M.E. is meal equivalent on the basis of 4 lb. potatoes to 1 lb. of meal.

† Lot IV received the same ration as Lot III for 20 additional days.

The costs of the above feeding stuffs, per cwt., including all freight charges, were:—

	s.	d.		s.	d.
Barley Meal	10	10	Limestone Flour ..	4	5
Tapioca Flour	8	0	Salt	5	7
Sharps	7	0	Steamed Bone Flour	12	0
Extracted Soya Meal	10	0			

The total quantities of foodstuffs consumed per pig were as follows:—

	Lot I (145 days)	Lot II (145 days)	Lot III (145 days)	Lot IV (165 days)
	lb.	lb.	lb.	lb.
Meals	702·25	537·5	387	286·25
Potatoes	—	732·75	1327	2411
Totals	702·25	721(M.E.)	719(M.E.)	889(M.E.)

The total costs of foods excluding potatoes were:—

54s. 10d.	41s. 5d.	29s. 1d.	20s. 7d.
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The first set of the above figures indicates how the proportions of the various constituents of the rations were modified as the animals grew. The tubers, drawn straight from the clamp, consisted of ware, seed and chats, which were cooked without further treatment except for the removal of an occasional excess of soil. Cooking was carried out by means of steam passed through water in which the potatoes were suspended in a metal basket; the outfit available only permitted 1 cwt. to be done at a time, thus involving very much higher costs than would be necessary where proper facilities were at hand. The potatoes were weighed and given the day following cooking, when they were quite cool, and were mixed with the other ingredients of the rations with cold water in the usual manner, being allowed to stand some hours before use.

In spite of feeding thrice daily the bulk factor was always a source of trouble with the pigs receiving potatoes; Lot I had no difficulty in cleaning up their trough, but the other three lots were invariably slower, this being very marked with Lot IV receiving the largest amount of potatoes. The daily meal equivalent of Lot IV, therefore, had to be maintained at a lower level than for Lots I, II and III. Rapidity of eating was directly dependent on the cubic capacity of the rations. For the first month the pigs receiving potatoes did not consume their food with the same relish as those having meals only, and it was not really till the eighth week, or when the pigs were five months old, that they began to be eager and efficient feeders. This was particularly noticeable in regard to Lots III and IV getting the larger volumes. Analysis of potatoes reveals that they contain little or no oil; whether this had any influence over the external condition of the animals is a debatable point, but from the first seven to ten days the differences in the intensity of "bloom" were most apparent, depending on the proportion of cooked potatoes. Although the difference in this respect between Lots I and II was not very marked, Lot III was definitely inferior, whilst Lot IV, given the greatest quantity of potatoes, soon developed a very poor and unthrifty appearance.

The test commenced on February 27, 1930, and for Lots I, II and III lasted 145 days, whilst Lot IV required a further twenty days.

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Progress in Live Weight.

Lots.	AVERAGE PER PIG.			
	I	II	III	IV
	lb.	lb.	lb.	lb.
Gain first 8 weeks	47.8	44.7	47.5	43.9
Gain „ 16 „	132.6	129.3	128.7	118.2
Gain „ 20 „	177.3	170.8	166	139.1

The above data of live-weight increases show that up to the end of the first two months of feeding there were no significant differences between the lots, but from that point Lot IV gradually lost ground to the rest so that by the end of the sixteenth week the individuals averaged 14.4 lb. behind those in Lot I, and over 10 lb. less than those in Lots II and III. The former difference is statistically significant whereas the latter is barely so. Up to this stage the added minerals for all pigs had been salt and limestone, but in view of the poor record of Lot IV the possibility of a phosphoric acid shortage suggested itself in connexion with the rations containing potatoes (0.15 per cent. P_2O_5). In order to test this point from the sixteenth week onwards Lots II, III and IV had part of the limestone replaced by steamed bone flour at the rate of 1, 2 and 4 oz. per lb. of limestone respectively. No beneficial effect accrued from this alteration, as Lot IV continued to lost ground, whilst the remaining groups slowly arranged themselves in the order of potato supply, Lot I, with meals only and no bone flour, increasing its advantage. The average gains for the twenty weeks fully confirm these facts and present the heavy feeding of potatoes in an unfavourable light, since after five months Lot III were ahead of Lot IV by nearly 27 lb. It should be pointed out, however, that the lower total protein percentages of the rations of the potato lots might account for the slightly lower live-weight increases of Lots II and III in relation to the control lot receiving a higher proportion of protein, although this does not satisfactorily explain the poor record of Lot IV.

Below are summarized the costs incurred per pig, together with the calculated returns obtained for the raw potatoes per ton. Cost of cooking per ton of potatoes was 14s. 4d.

With reference to these details of expenditure, no charge was made for the raw potatoes, since the stock, fuel, meals, etc., were purchased with the sole aim of providing a useful outlet for the former as pig meat; consequently the assessed value per ton of the potatoes was arrived at by dividing the cash profit per hog on this basis by the number of cwt.

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	<i>Costs per Pig.</i>			
	Lot I	Lot II	Lot III	Lot IV
	s. d.	s. d.	s. d.	s. d.
Meals consumed ..	54 10	41 5	29 1	21 11
Labour and Overheads ..	5 8	5 8	5 8	5 8
Cost of Store Pig ..	47 6	47 6	47 6	47 6
Potato cooking costs ..	—	4 4	8 8	12 11
Total ..	108 0	98 11	90 11	88 0
Receipts at 15s. a score ..	128 8	124 11	121 3	113 4
Surplus ..	20 8	26 0	30 4	25 4
Weight of raw Potatoes consumed		660 lb.	1,194 lb.	2,170 lb.
Assessed value of Potatoes per ton, on basis of surplus ..		88s. 3d.	56s. 10d.	26s. 1d.

of potatoes that it consumed. No allowance was made for the questionable charge of interest on capital outlay. In view of the market price of potatoes current at the time (25s.) the financial results for the low (88s. 3d.) and medium (56s. 10d.) feeding of potatoes was highly satisfactory, but it is evident from the figure (26s. 1d.) of Lot IV that direct sale of the crop at 25s. a ton without the attendant risks of feeding, etc., and delayed receipts would have been a better proposition.

After nearly twenty-one weeks of fattening, when Lots I, II and III were ready for the butcher, the pigs in Lot IV were approximately 30 lb. lighter than the remainder, so that the feeding period of this lot had to be extended for a further three weeks when it took the ration of Lot III. Following the change, the pigs at once began to evince signs of interest in their food and soon commenced to clear their troughs in the normal time of about 25 minutes. In the above table of costs the receipts were based on the then current price of 15s. per 20 lb. dead weight, whilst the weights of raw potatoes used were arrived at by taking 10 lb. of boiled potatoes as equal to 9 lb. of raw.

Summary of Weight and Food Consumption Averages.

	Lot I	Lot II	Lot III	Lot IV
Meal consumed per lb.				
L.W.I. ..	3.85	4.07*	4.22*	5.33*
Initial weight ..	41.1	43.3	43.8	42.1
Total gain (145 days) ..	182.4	177.7	170.4	166.5†
Final weight ..	223.5	221.0	214.2	208.6

* Including potatoes on "meal equivalent" basis.

† 165 days.

Perusal of the above figures, showing the average recorded weights, again reveals the inferiority of the pigs that received the heaviest proportion of potatoes; actually after an additional twenty days of feeding their backward-

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ness was very marked in comparison with the other three groups; this is well illustrated by the differences occurring between the various final weights, total increases and meals consumed per lb. live-weight gain. Lot III, with the medium quantity of potatoes, was poor as judged by the eye and when compared with the control, though in actual fact the differences in live-weight gains were not such as the statistician would accept as "significant."

Carcasses.—Evidence was obtained of the comparative qualities of the carcasses from the experimental lots, not only by inspection and grading of the cured carcasses, but also by determination of the "Iodine Value" of the back fat of each individual hog. The latter was carried out with a short strip of fat cut from the back on the day of killing. The ranges of the Numbers given below of Lots I and II are more or less the same, but Lot III shows a tendency to higher numbers (i.e., softer fat) and this is very definitely so with Lot IV. Delayed progress in the growth of pigs usually leads to poor carcass quality, so that the blame for the poor quality of Lot IV is not necessarily attributable directly to the potatoes; practical experience indicates, indeed, that where potato-fed pigs do well the quality is good. This evidence from analysis was roughly borne out by the respective carcass gradings and inspection, from which it will be noted that neither the bacon nor hams of Lot IV were of a sufficiently high standard to be included in the "A" class, though the latter were emphatically better than the former. The carcasses of the other lots were quite satisfactory, as they possessed hard and white fats free from greasiness except for a slight suggestion of this in a few of the sides from Lot III.

<i>Iodine Values.</i>				
	Lot I	Lot II	Lot III	Lot IV
	52.5—56.3	50.3—56.5	55.2—59.3	59.2—63.4
<i>Carcass Grading.</i>				
	Lot I	Lot II	Lot III	Lot IV
Bacon	A	A	A—	B
Hams	A	A	A	A—

The letter "A" signifies first quality, "A—" slightly inferior, and "B" second quality.

Summary.—The general results and progress of this experiment would seem to indicate that for satisfactory feeding cooked potatoes should not be included in rations for pigs under four months of age, after which they can

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displace one-third of the starchy foods (barley, maize, etc.) until the fifth month when, if desired, the proportion can be gradually increased to a limit of two-thirds. Beyond that amount the feeding of ware and seed potatoes would appear to be uneconomic. The financial results of Lot II are very impressive compared with those of Lot III, and the prices ruling in the potato market in the early part of 1930, but with the light ration of potatoes given to this lot a small tonnage is disposed of unless the pigs are in considerable number. The heavier feeding of potatoes to Lot III yielded a much lower, though still satisfactory, return per ton, and having due regard to practical necessities would seem to be the ideal to aim at in practice. Judged by the results, it would apparently safeguard the three important points of good live-weight increase, reasonable pecuniary return per ton, and a fair disposal of an almost unmarketable crop.

At the price current for foodstuffs and for store and fat pigs at the time of the test the actual values realized by the light and medium quantities of potatoes were, as shown earlier in this report, 88s. 3*d.* and 56s. 10*d.* per ton respectively; at the present time with feeding stuffs at 6s. 6*d.* a cwt., three-months-old stores worth 30s. each and baconers 12s. per score, the prices realized would be approximately 97s. 10*d.* and 56s. 9*d.* per ton. These figures are very favourable, for it must be remembered that they include ware, seed and chats, whereas potatoes sold through conventional channels are valued at about 50s. a ton for the first grade alone.

ACKNOWLEDGMENTS.—Thanks are due to Dr. Chas. Crowther for his advice in the conduct of the experiment, to Messrs. Marsh & Baxter, Ltd., of Brierley Hill, for facilities for the examination of hams and bacon; and to Mr. G. H. Botham, B.Sc., A.I.C., of the Chemistry Department, for fat determinations.

REPORT ON THE WORK OF THE EDUCATION AND RESEARCH DIVISION OF THE MINISTRY FOR THE YEAR 1931-32*

PART I.—RESEARCH (INCLUDING LOCAL INVESTIGATION AND ADVISORY WORK)

THE work of the Ministry in connexion with agricultural research may again be conveniently reviewed (after a few general remarks) under the following heads: (a) National Agricultural Research; (b) Imperial Agricultural Research; (c) Local Investigation and Advisory Work; (d) Miscellaneous Experimental and Demonstrational Work; (e) Scholarships, Fellowships, etc.

The total annual State expenditure is met from three sources: the Development Fund, the Empire Marketing Fund and the Ministry's Vote. The expenditure in the financial years 1931 and 1932 is given in Table I at the end of this Report (p. 623). Of the total expenditure, which in 1932 amounted in round figures to £291,600 (a reduction of over £40,000 on the figure for 1931), £262,800 was provided from the Development Fund, £19,500 from the Empire Marketing Fund, and £9,300 direct from the Ministry's Vote. More than half this expenditure took the form of grants to Research Institutes; the greater part of the remainder was for local investigation and advisory work at certain Universities and Agricultural Colleges.

General.—The main events influencing the administration of agricultural research during the academic year October, 1931, to September, 1932, were the economic crisis, the full effects of which began to be felt in the autumn of 1931, and the commencement, about the same time, of the activities of the Agricultural Research Council.

As a result of the crisis, not only was the development of research suspended, but State aid for research already in progress was curtailed. Details of particular measures affecting individual items of agricultural research, adopted

* The Annual Report on the work of the Education and Research Division of the Ministry for the year 1931-32 will not be published as a separate volume, as was the custom before last year. In place of the separate volume, a brief account of the work will again be given by three articles, in this JOURNAL, of which this is the first. The other two articles, dealing with the work of Education and Horticulture, respectively, will appear in the two following issues of the JOURNAL.

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in order to reduce expenditure, will be found in the appropriate paragraphs of later sections of this report. The most important economy measure, however, was one that affected the bulk of the expenditure on agricultural research. Annual maintenance grants in aid of research and advisory work were reduced as from October 1, 1931, in accordance with a common formula that took account not only of maintenance expenditure but of the graded salary scales then in force, these scales being subjected to the standardized reductions (ranging from 5 to 10 per cent. according to amount) imposed by the Treasury. The net effect of the formula was to reduce the grants paid, in comparison with those of the previous year, by an amount approximating to 5 per cent.

Some institutions, however, have found it difficult to adopt these reduced salary scales, and this is particularly true of institutions attached to universities where similar reductions have not been made in the case of other classes of workers. It was accordingly decided that, as regards 1931-32, no objection should be taken in such instances if graded salaries were not reduced (or not reduced to the required extent), provided that the excess thus incurred under the head of graded salaries was met from savings under other heads of the grant or from the institution's own funds.

The slowing down of developments in research work has afforded the Agricultural Research Council a convenient opportunity for taking stock of results so far achieved, with the object of making recommendations for the future. The Council, which consists of leading authorities in the sciences related to agriculture, and of persons distinguished for their interest and experience in practical agriculture, was established in 1931 for the purpose of furthering the organization and development of agricultural research. It is carrying out a systematic review of the whole of the research in progress in Great Britain, and its advice is sought in regard to matters affecting the annual research programmes of the centres aided by the Ministry, and the award of research scholarships and special research grants.

A limited sum of money is also available to the Council for the direct assistance of research.

(a) National Agricultural Research: (1) *Block Grants to Research Institutes from the Development Fund.*—The

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Ministry's activities in connexion with agricultural research are principally concerned with the main research programmes carried out by agricultural research institutes with the aid of annual "block" grants from the Development Fund made in respect of the academic year. The grants sanctioned for the years 1930-31 and 1931-32 are set out in Table II on p. 624.

The grants for the period in question were reduced in accordance with the common formula. In certain instances the grant paid in respect of 1931-32 exceeded that for 1930-31, but this was generally due to the fact that the full financial effect of developments approved in the course of the earlier year was not felt until the later one. In the case of the National Institute for Research in Dairying, however, the grant was kept at approximately the same level as in 1930-31, in order that the Institute, pending a review of the position by the Agricultural Research Council, might be enabled to continue its work on faults in dairy produce, formerly aided by a grant from the Empire Marketing Fund. There was also no reduction in the case of the Fruit and Vegetable Preservation Station, Chipping Campden, the grant having been fixed for a period of five years under an agreement with the firms contributing to the support of the Station.

A full statement of the investigations in progress at the various institutions is given in a volume published by the Ministry, entitled *Reports on the Work of Agricultural Research Institutes and on certain other Agricultural Investigations in the United Kingdom, 1931-32*.*

(2) *Capital Grants to Research Institutes from the Development Fund*.—For reasons of economy no new capital grants were sanctioned during the year. The payments made, which related to schemes already approved, included the second annual instalment (£10,000) of the grant of £50,000 sanctioned as a contribution towards the sum collected by the University of Cambridge in order to secure the Benefaction offered by the Rockefeller Foundation for the development of agriculture and the allied sciences, and to provide for new buildings on the University Farm. The extension to the School of Agricul-

* Copies of this volume will shortly be on sale at H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Copies of the companion volumes for 1928-29, 1929-30 and 1930-31 may be obtained, free of charge, on application to the Ministry.

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ture, provided under the Rockefeller Scheme, has been completed, and plans for the extension to the Botany School have recently been approved.

(3) *Grants from the Development Fund for Special Problems.*—In addition to the "block" grants in aid of the main work of research institutes, supplementary grants are made to enable research institutes and other centres to carry out specific investigations into special problems. These grants are on a "deficiency" basis, i.e., they cover the expenditure actually incurred (up to an approved maximum). The amounts sanctioned for 1930-31 and 1931-32 will be found in Table III (p. 624), which, for purposes of convenience, also includes the annual "block" grant (chargeable direct to the Ministry's Vote) in respect of the Official Seed Testing Station and the Potato Testing Station at the National Institute of Agricultural Botany. Reports on the work carried out with the aid of these grants are included in the volume mentioned on p. 614.

The investigation carried out at Cambridge into the silver leaf disease of fruit trees was concluded with the grant for 1930-31; with this exception all the grants made in 1930-31 were continued in 1931-32. The maximum sums payable were, however, reduced in accordance with the common formula, except in the case of the grant for testing new varieties of fruit trees, which was maintained at the rate agreed upon with the Royal Horticultural Society pending consideration of the future of the scheme. As regards the investigations into the improved management of grass land, the grant for the work done by Bristol University was terminated on March 31, 1932; the Agricultural Research Council, however, as from that date, made a grant to provide for chemical assistance in connexion with the University's general research on grass-land problems.

(4) *Special Research Grants from the Development Fund.*—These grants, awarded on the recommendation of the Development Commission's Advisory Committee on Agricultural Science, were for the purpose of enabling individual workers or groups of workers to investigate problems of limited scope outside the main work of the research institutes. As an economy measure, it was decided that no new grants could be awarded in 1931. Certain previous grants were, however, renewed for the academic year 1931-32 on the recommendation of the Advisory Committee and these are set out in Table IV (p. 626). In 1932

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renewals were sanctioned on the recommendation of the Agricultural Research Council, which for this purpose, has taken the place of the Advisory Committee (dissolved in 1931 on the formation of the Council).

(5) *Other Investigations, financed directly by the Ministry.*—In addition to the grants from the Development Fund, described above, a number of grants were made during the year from the Ministry's fund for miscellaneous inquiries and experiments. These grants are set out in Table V (p. 625).

(b) **Imperial Agricultural Research :** (1) *Grants from the Development Fund.*—The annual contributions for England and Wales towards the maintenance of the Imperial Agricultural Bureaux, the Imperial Institute of Entomology and the Imperial Mycological Institute are set out in Table I. The Bureaux and the two Institutes are supported by contributors from various parts of the Empire under an arrangement that contemplated the annual renewal of grants over a five-year period; and, in the circumstances, it was decided that the contributions from this country should be maintained at the rate originally proposed.

During the year under review, Sir Charles J. Howell Thomas, K.C.B., C.M.G., Permanent Secretary to the Ministry, continued to represent England and Wales upon the Executive Council of the Bureaux, and also acted as Vice-Chairman of the Council.

(2) *Grants from the Empire Marketing Fund.*—A list of the maintenance grants paid in respect of research schemes financed from the Fund and administered by the Ministry is given in Table VI (p. 627). The grants, which are paid on a "deficiency" basis, have as a rule been sanctioned by the Empire Marketing Board for a period of years (usually five). The maximum grants payable in 1931-32 were reduced in accordance with the principles applied in the case of the Development Fund grants. The Reports volume previously mentioned includes an account of the work carried out with the aid of the Empire Marketing Fund grants.

As indicated in the Table, the grants in respect of five schemes were terminated during the period under review; but in the case of the Wild Rodents investigations at Oxford assistance for work on grey squirrels and musk-rats was given for a further year out of the Ministry's own funds.

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Subsequently a grant was made by the Agricultural Research Council.

The five-year sanctions in the case of the Bristol and East Malling schemes expired in July and September, 1932, respectively. In both instances, the grant was renewed by the Board, but owing to the financial position, the scale of aid was considerably reduced; and owing to the uncertainty of the Board's future, sanctions could only be obtained for interim grants taking the two schemes up to March, 1933, in the first place, and then to September, 1933. As regards East Malling a consolidated grant was sanctioned at the rate of £7,050 per annum, in place of the two grants previously paid; in the case of Bristol the annual rate of grant was reduced to about £1,350.

Owing to lack of funds no new capital grants could be sanctioned during the year: the payments made were in respect of the completion of schemes already approved.

(c) Local Investigation and Advisory Work.—The general lines of the Ministry's scheme for the provision of specialist advice to farmers have been described in previous Reports, and details of this service are contained in the Ministry's publication, Form A705/T.G. In each of the areas into which the country has been divided for this purpose, there is an Advisory Centre—attached either to a University with a Department of Agriculture or to an Agricultural College—at which are stationed specialist advisory officers. In addition to carrying out local investigations into the problems arising in their areas, the advisers keep in close touch with the work of research institutes concerned with their respective subjects in order that farmers may be made acquainted with the practical results emerging from the investigations undertaken on their behalf. At the end of September, 1932, the number of Advisory Centres was reduced to thirteen by the closing down of the Oxford centre for reasons of economy, the two counties formerly served by that centre being now part of the area attached to Reading University. A statement of the grants made from the Development Fund in respect of the various advisory centres is given in Table VII (p. 629).

The investigational work carried out by advisers during the year is reviewed annually in the volume of Reports on the work of Agricultural Research Institutes, etc., pre-

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viously mentioned. Brief notes are given below concerning the work of each group of advisers.

(1) *Chemistry*.—Soils and manures continued to provide the greater proportion of the problems receiving the attention of the advisory chemists, although much work was done in connexion with feeding stuffs and the control of weeds. Several of the advisers are co-operating in a joint scheme of soil surveying and classification under the direction of the Soil Survey Conference.

(2) *Entomology*.—Progress in this service has been very satisfactory, especially in the provinces that comprise much intensive cultivation. The advisory entomologists are concerned mainly with the local control of insect pests. They work in close touch with the Ministry's Plant Pathological Laboratory, to which they send periodic reports of the incidence of pests in their areas, their relative importance and the seasonal variation in intensity of attack. A large proportion of the investigations made by these advisers relates to the use of insecticides by spraying and other means.

(3) *Mycology*.—The advisers in mycology also work in close relation with the Ministry's Plant Pathological Laboratory (to which they report upon the incidence of fungus diseases in their provinces), and conduct various local investigations, among which may be particularly mentioned a piece of co-operative work on Finger-and-Toe disease. The value of the assistance that these officers can render is definitely appreciated by growers, and their services are in increasing demand.

(4) *Economics*.—The total number of advisers is eleven, the one stationed at Aberystwyth acting for the whole of Wales. There is a steadily growing demand for the help of these advisers in every phase of farm economics, and the co-operation of a large number of farmers in various schemes of costing and management was secured. A survey of the willow-growing industry in Somerset has been made by the adviser at Bristol, who has also been conducting an inquiry into costs of production of strawberries. A survey of poultry management was in progress in three provinces, and nearly all advisers participated in a joint inquiry relating to methods of management for milk production. Under this heading it is convenient also to mention an extensive Farm Management Survey which is being carried out by the Advisory Economics Branch of the School of Agriculture,

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Cambridge, with the help of a special grant. The main object of the survey is to obtain information on farm management from a sufficiently large number of farms of various types to make it possible to draw inferences applicable to the eastern counties as a whole.

(5) *Veterinary Science*.—The work of the advisers followed the lines of that done in previous years. Work on poultry diseases continued to occupy a good deal of attention; but the whole field of animal diseases affords vast scope for local co-operative inquiry.

(6) *Dairy Bacteriology*.—Most of the Dairy Bacteriological Assistants have in the past been engaged in analytical and advisory work arising out of clean milk competitions. During the past year, however, the urgent need for economy caused several authorities to suspend or modify these competitions, and the bacteriologists have thus been able to explore other channels through which advice to the dairy farming industry might be directed. In certain areas where schemes of "accredited milk" production are being operated by the county authorities, including the areas centring around Bristol, Cambridge, Harper Adams and Reading, the bacteriologists have co-operated and provided valuable assistance.

(d) Miscellaneous Experimental and Demonstrational Work: *Research into Foot-and-Mouth Disease*.—During the past year the work of the Foot-and-Mouth Disease Research Committee has been continued at the various centres under its control. Investigations on both large and small animals were carried out at the Pirbright Experimental Station, where the main activities of the Committee are concentrated. Experiments on large farm animals are exclusively confined to this station. Laboratory experiments on small animals have been continued at the Lister Institute, the National Institute for Medical Research, and the Public Health Laboratory of the University of Manchester.

The results of experiments carried out by one of the Committee's research workers on the filtration of the foot-and-mouth virus were published in *British Journal of Experimental Pathology* (Vol. XII, October, 1931).

The expenditure of the Committee in the financial year 1931-32 amounted to £14,710. Salaries and wages accounted for £6,289, structural alterations at the Experi-

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mental Station, repairs, rates and farming expenses for £1,612, laboratory equipment, materials, animals and miscellaneous expenditure for £6,785, and the expenses of the Committee for £24. The total expenditure of the Committee since it was set up in 1924 to the end of March, 1932, now amounts to approximately £105,000.

Flax.—In the interests of national economy, and having regard to the depressed condition of the flax industry, no crop was grown for the two factories at Lopen and Yeovil in 1932. Operations were confined to processing the balances of the 1930 and 1931 crops. The products are being placed on the market as soon as they are ready, and are sold as opportunity offers. Efforts are being made to dispose of the factories as a going concern.

Agricultural Meteorology.—Thirty-two centres continued to participate in the Agricultural Meteorological Scheme. Meteorological observations are taken at all stations. In addition, standardized observations on wheat and apple trees are taken at certain stations, whilst at others phenological observations on selected flowers and plants are taken. The object of these observations is to obtain precise data which will give a statistically sound basis for correlation between crop growth and weather.

The operations of the scheme were somewhat modified during the summer of 1932. Meteorological observations are now taken only once daily, except at a few stations where self-recording instruments are established, and the issue of the monthly crop weather report has been discontinued. Efforts are being directed by the Agricultural Meteorological Committee towards encouraging a greater degree of local study of weather in relation to crop progress at the various stations. The Agricultural Meteorological Committee has drawn up an outline of a course of lectures in agricultural meteorology for the use of agricultural teaching institutions, which has now been circulated in this country and throughout the Empire.

Agricultural Machinery: (a) Demonstrations.—A series of mole-draining demonstrations was carried out in January and February, 1932, at centres in Derbyshire, Norfolk, Cambridgeshire and Surrey. In view of the financial position, no further demonstrations were carried out.

(b) Testing of Agricultural Machinery.—The Agricultural Machinery Testing Committee has presented its second report covering the period April 1, 1930, to March 31, 1932. During that period, 29 further applications for tests were accepted by the Committee, and 15 tests were completed and certificates and reports issued. All the tests were conducted either by the Institute for Research in Agricultural Engineering, Oxford, or by the National Institute for Research in Dairying, Reading. The machines tested included tractors, a mowing machine and cattle-drinking bowls, together with dairying apparatus, including milk coolers, milk strainers and filter discs, a milking machine and a paper milk container. Certificates and reports on the individual tests have been published separately as they became available, and placed on sale by the Stationery Office. For the better operation of the Testing Scheme, the Ministry has, at the suggestion of the Committee, slightly revised the regulations and the scale of fees.

Basic Slag.—The experiments supervised by the Permanent Committee on Basic Slag were continued during the year. A 10th Interim Report dealing with the experiments carried out in 1931 and containing statistics of deliveries of basic slag in this country over a series of years was issued by the Committee in September, 1932. The grant approved for this work is shown in Table V (page 625).

EDUCATION AND RESEARCH REPORT.—I

Electro-Culture.—The 14th Interim Report of the Electro-Culture Committee was issued in July, 1932. It deals with the experimental work carried out in 1931, when, as in previous years, pot culture experiments were conducted at Rothamsted Experimental Station, and laboratory work at the Imperial College of Science and Technology. The necessary provision for expenditure on these institutions is included in the block grant to the College. (See Table II, page 624.)

Extension Lectures.—Arrangements were again made for members of the staffs of Research Institutes and Advisory Centres and of the Ministry to deliver lectures on various agricultural topics at the request of Agricultural Organizers acting in collaboration with local branches of the National Farmers' Union. During the winter session 1931-32, 188 lectures were given by 55 workers at 122 centres in 42 counties, the average attendance being 63.

Sugar-Beet.—As in previous years, a series of trials was conducted with the aid of funds provided by the beet sugar factories.

(1) VARIETY TRIALS were again carried out under the supervision of the National Institute of Agricultural Botany on experimental plots at the Institute itself, and at Good Easter, Norwich, Newport (Salop), Bridgwater and in the Fens. A new sub-station was established in Yorkshire. A report on the trials carried out during the three years 1930-1932 will be published in the Institute's journal in due course. The grants made by the factories for these investigations were £1,000 in 1927, £602 in 1928, £880 in 1929, £980 in 1930, £600 in 1931, and £650 in 1932.

(2) MANURIAL TRIALS.—A grant of £250 was made for the continuance of manurial experiments by the Rothamsted Experimental Station, both at that Station and at a number of other centres. A further grant of £150 was made for laboratory work, including the analyses of sugar-beet samples and examination of soils from the experimental centres.

(3) VARIETY-MANURIAL TRIALS, in which variety and manurial trials were combined in single experiments, were carried out at several centres jointly by the Rothamsted Experimental Station and the National Institute of Agricultural Botany. A grant of £120 was sanctioned for these experiments.

(4) MACHINERY.—Implement trials were carried out by the Norfolk Agricultural Station, with particular reference to the possibility of labour economy by the use of mechanical devices. The grant sanctioned for these investigations was £85.

(5) BEET MOLASSES PULP INQUIRY.—Arising out of the earlier work into the use of molassed beet pulp as a feeding stuff, it was arranged that further research of a fundamental chemical and biological nature on the problem of taint in milk arising from feeding beet molasses pulp to dairy cows should be carried out. The investigations were conducted at the National Institute for Research in Dairying and at the Midland Agricultural College at a cost of £621.

(e) **Scholarships, Fellowships, etc.**—The Ministry awarded in 1931, as in previous years, a number of post-graduate research scholarships for persons intending to pursue a career in agricultural or veterinary research, as well as a number of general scholarships for intending agricultural organizers, teachers and lecturers, these awards being made on the recommendation of the Development Commission's Advisory Committee on Agricultural Science.

EDUCATION AND RESEARCH REPORT.—I

Research Scholarships are normally of three years' duration, and general scholarships of two years', the final year in each case usually being spent abroad, often in America. On grounds of economy, however, visits abroad during the academic year 1932-33 are being limited to the continent of Europe. No awards of general scholarships were made in 1932, but on the advice of the Agricultural Research Council two research scholarships and two studentships for research in animal health were given to students from England and Wales. In the financial year 1932 these were carried on the Ministry's own vote, but arrangements have been made for expenditure in 1933 on such scholarships to be met, as hitherto, out of the Development Fund. Particulars of the awards made in July, 1932, for England and Wales are given in Table VIII (p. 628).

During the year ended September 30, 1932, fifteen research scholars, and eight general scholars, whose appointments have been recorded in previous reports, were pursuing their studies. Of the research scholars, five were in their first year, five in their second year and five in their third year (three in the United States and one in Germany). Of the general scholars, six were in their first year (two in the United States of America and one in Denmark) and two in their second year (one in the United States of America and the other in New Zealand and South Australia).

Travelling fellowships are awarded on the recommendation of the Advisory Committee to enable agricultural research and advisory workers to travel abroad in order to obtain a closer knowledge of the progress of research and advisory work in other countries; three were held during 1931-32. Dr. F. Bewley, director of the Experimental and Research Station, Cheshunt, visited France and Holland to study market-gardening methods. Dr. K. A. H. Murray, of the Agricultural Economics Research Institute, Oxford, visited Germany to investigate work in connexion with agricultural prices and statistics. Dr. J. A. Venn, of Cambridge University, visited Ceylon and Japan to study the organization of teaching and research in agricultural economics, but was unable to visit the United States and New Zealand as originally proposed, owing to his recall to Cambridge on being appointed President of Queens' College. On grounds of economy no fellowships were awarded by the Ministry in 1932.

EDUCATION AND RESEARCH REPORT.—I

TABLE I.—EXPENDITURE ON AGRICULTURAL RESEARCH
(INCLUDING LOCAL INVESTIGATION AND ADVISORY
WORK) IN THE FINANCIAL YEARS 1931 AND 1932.

	1931. £	1932. £ (Subject to slight amend- ment.)
(1) National agricultural research at Research Institutes, mainly of a fundamental and continuous character, but including also specific schemes:		
Capital expenditure	15,973*	10,243*
Annual expenditure	161,959*(a)	157,836*(a)
(2) (i) Imperial agricultural research schemes at Research Institutes:		
Capital expenditure	6,856†	202†
Annual expenditure	23,324†	19,341†
(ii) Contributions to Imperial Agricultural Bureaux	3,125*	3,125*
(iii) Contribution to Imperial Institute of Entomology	1,500*	1,500*
(iv) Contribution to Imperial Mycological Institute	750*(b)	500*
(3) Special research scheme for foot-and-mouth disease	14,681*	14,821*
(4) (i) Special research schemes, national and local, of a definite character and a limited period	2,098*	1,634*
(ii) Ditto, but including some special schemes of a continuing character	2,440†	2,035†
(iii) Ditto, Farm Management Survey	1,078†(c)	1,888†
(5) Local research and specialist advisory work	72,015*(d)	69,952*(d)
(6) Post Graduate Scholarships (Research and Training), Fellowships, etc. ..	7,190*	4,646§
(7) (i) Testing of seeds and potatoes ..	5,170†	4,915†
(ii) Testing of agricultural machinery	60†(e)	52†(e)
(iii) Agricultural machinery demonstrations	513†	—
(8) Flax Development:		
Capital expenditure	483*	—
Loans (net) for working capital ..	13,431*	957*(f)
	<hr/> £332,526 <hr/>	<hr/> £291,629 <hr/>

* Financed from Development Fund.

† Financed from Empire Marketing Fund. Does not include expenditure on Empire Marketing Board schemes administered by the Ministry on an agency basis (see Table VI).

‡ Financed direct from Ministry's Vote.

§ Financed from Development Fund, except as to £492 from Ministry's Vote.

(a) Including expenditure on Northern and Southern poultry breeding experiments under National Poultry Institute scheme (1931, £1,305; 1932, £1,320). See Part II of this Report (Education).

(b) Including £250 in respect of previous year's grant.

(c) Expenditure for six months ending March, 1932.

(d) Including grant to Norfolk Agricultural Station (1931, £1,079; 1932, £1,016).

(e) Excess of receipts over expenditure.

(f) Receipts (rent and interest).

EDUCATION AND RESEARCH REPORT.—I

TABLE II.—ANNUAL GRANTS TO RESEARCH INSTITUTES FROM DEVELOPMENT FUND.

<i>Institute.</i>	<i>1930-31.</i> £	<i>1931-32.</i> £
Soils and Crops:		
Rothamsted Experimental Station ..	27,600 (23)*	26,210 (23)
Imperial College of Science ..	6,300 (5)	6,090 (5)
Cambridge Plant Breeding Institute ..	4,000 (3)	3,850 (3)
Welsh Plant Breeding Station ..	8,150 (5)	7,820 (5)
National Institute of Agricultural Botany (Administrative and Crop Improvement Branches) ..	4,500†	4,350†
Horticulture:		
Agricultural and Horticultural Research Station, Bristol ..	14,600 (12)	14,060 (12)
Fruit and Vegetable Preservation Research Station, Chipping Campden ..	3,000 (2)	3,000 (2)
East Malling Research Station ..	8,550 (4)	8,160 (4)
Cambridge Horticultural Research Station ..	2,670 (2)	3,840 (3)
Experimental and Research Station, Cheshunt ..	4,000 (5)	4,810 (5)
Animal Pathology:		
Royal Veterinary College ..	5,100 (5)	4,900 (4)
Cambridge Department of Animal Pathology ..	12,300 (7)	11,790 (8)
London School of Hygiene and Tropical Medicine ..	5,300 (4)	5,110 (4)
Animal Husbandry:		
Cambridge Animal Nutrition Institute ..	12,804 (9)‡	12,925 (9)
Cambridge Small Animal Breeding Institute ..	1,132 (1)	900 (1)
National Institute for Research in Dairying ..	14,300 (8)	14,370 (8)
Economics:		
Oxford Agricultural Economics Research Institute ..	8,400 (5)	8,040 (5)
Engineering:		
Oxford Institute of Agricultural Engineering ..	12,700 (5)	11,840 (5)

* The figures in brackets indicate the number of graded research workers.

† Year ending March 31.

‡ Includes, as from January 1, 1931, work transferred from the Small Animal Breeding Institute.

TABLE III.—GRANTS FROM DEVELOPMENT FUND FOR SPECIAL INVESTIGATIONS.

<i>Institution.</i>	<i>1930-31.</i> £	<i>1931-32.</i> £
Crop Variety Trials:		
East Anglian Institute of Agriculture	2,708	2,443
Harper Adams Agricultural College		
Lord Wandsworth Agricultural College		
Norfolk Agricultural Station		
Somerset County Farm Institute		
Testing of seeds and potatoes (a):		
National Institute of Agricultural Botany ..	5,325*	5,170*
Testing of new varieties of fruit trees:		
Royal Horticultural Society ..	1,080*	1,100*

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<i>Institution.</i>	<i>1930-31.</i> £	<i>1931-32.</i> £
<i>Virus diseases of potatoes:</i>		
Cambridge University	2,923	2,770†
<i>Improved management of grass land:</i>		
University College of Wales, Aberystwyth	848	705
Bristol University		
<i>Pig husbandry:</i>		
Harper Adams Agricultural College	747	560‡
South-Eastern Agricultural College, Wye		
<i>Silver leaf disease of fruit trees:</i>		
Cambridge University	1,200	—
<i>Kent fruit soil survey:</i>		
East Malling Research Station	900	860
South-Eastern Agricultural College, Wye		
(a) Financed direct from the Ministry's Vote and not from the Development Fund.		
* Year ending March 31.		
† A supplementary grant of £191 was also made to cover expenditure incurred in 1929-30.		
‡ A supplementary grant of £140 has since been sanctioned in respect of a deficiency on the Wye experiments up to 1931-32.		

(Table IV.—See page 626.)

TABLE V.—GRANTS FROM MINISTRY'S VOTE FOR MISCELLANEOUS INVESTIGATIONS.

<i>Investigation and Institution.</i>	<i>Amount of grant, 1931-32.</i> £
<i>Commercial production of virus-free seed potatoes:</i>	
University College of North Wales, Bangor	452
<i>Bacterial diseases of plants:</i>	
Imperial College of Science and Technology	238
<i>Basic Slag experiments at various centres:</i>	
Rothamsted Experimental Station	280
<i>Agricultural Meteorology:</i>	
Apparatus, observers' courses, etc., at various stations	338
<i>Wastage of cows in dairy herds:</i>	
Cambridge University	164
National Institute for Research in Dairying, Reading	
<i>Walnut cultivation:</i>	
East Malling Research Station	281
<i>Pyrethrum trials:</i>	
South-Eastern Agricultural College, Wye	12
<i>Investigations into Economic Ornithology:</i>	
Oxford University	125
<i>Mycological examination of tubers from indoor wart disease tests at Omskirk:</i>	
Rothamsted Experimental Station	50
<i>Correlation of work of provincial dairy bacteriologists:</i>	
National Institute for Research in Dairying, Reading	19
<i>Grey Squirrel investigations:</i>	
Oxford University	270
<i>Orchard spraying experiments:</i>	
South-Eastern Agricultural College, Wye	18
<i>Eelworm Experiments:</i>	
Leeds University	35
<i>Field investigation of Strawberry diseases:</i>	
Reading University	140
	625

TABLE IV.—SPECIAL RESEARCH GRANTS FROM DEVELOPMENT FUND.

<i>Subject.</i>	<i>Institute.</i>	<i>Investigator(s).</i>	<i>Amount of grant 1931-32. £</i>
1. Use of B.C.G. vaccine in the protection of calves against tuberculosis	Cambridge: Institute of Animal Pathology	Professor J. B. Buxton and Dr. A. S. Griffith	475
2. Effects of stubble cleaning	Cambridge: School of Agriculture	W. A. Jones	298
3. Apple mildew	Oxford: School of Rural Economy	R. C. Woodward	38
4. Breeding of oats for resistance to frit fly	Do.	N. Cunliffe	235
5. Solids-not-fat in milk	Reading University	M. N. Nicholson and C. E. Lesser	352
6. Broccoli breeding research	Seale-Hayne Agricultural College	F. R. Horne	124
7. Struck and gangrene diseases of sheep on Romney Marsh	Wye: South-Eastern Agricultural College	A. D. McEwen and R. S. Roberts	333

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TABLE VI.—GRANTS FROM EMPIRE MARKETING FUND.

<i>Institution.</i>	<i>Subject.</i>	<i>Amount of grant, 1931-32*.</i>
East Malling Research Station	Rootstock investigations	£ 5,175(a)
	Extension of facilities for research	2,473
Welsh Plant Breeding Station	Seed production (herbage plants)	4,451
	Overseas grassland adviser (home expenses)	423
Imperial College of Science and Technology	Stored Food Products Infestation	2,947(b)†
Bristol University (Long Ashton Research Station)	Cultural conditions affecting keeping qualities of fruit	2,401
Rothamsted Experimental Station	Virus diseases in plants	2,141
	Black Arm disease of the cotton plant	173†
Experimental and Research Station, Cheshunt do.	Virus diseases of plants	1,085
	Pests and diseases of market garden crops	422(c)
National Institute of Poultry Husbandry (Harper Adams Agricultural College)	Poultry (egg and meat) production	1,549
Oxford University (Agricultural Economics Research Institute)	Agricultural Economics in the Empire	550†
University College of North Wales, Bangor	Methods of soil analysis	542(d)
Oxford University (Department of Zoology—Bureau of Animal Population) do.	Fluctuations in number of wild rodents	355(e)
	Factors controlling reproduction and breeding seasons of wild field mice	121(e)
Oxford University (Department of Zoology)	Economic ornithology	250(f)
Cambridge University (Animal Nutrition Institute) do.	Poultry nutrition (fat formation)	367
	Physiology of reproduction and growth of farm animals	243(g)
East Anglian Institute of Agriculture (Essex County Council)	Cultivation of <i>Spartina Townsendii</i> in tidal zones	243

* Accounting year of institution.

† Grants paid in respect of schemes, mainly of overseas interest, administered by the Ministry on an agency basis (not included in Table I).

(a) Includes £171 in respect of expenses of visit of East Malling pomologist to Summerland Experimental Station, British Columbia, under scheme for exchange of Empire workers in agricultural science.

EDUCATION AND RESEARCH REPORT.—I

- (b) For eight months ended March 31, 1932. Grant paid by Empire Marketing Board direct after that date. In addition, £493 was paid in the financial year 1931-32 to complete the capital grant in respect of this scheme.
- (c) For six months. Grant terminated March 31, 1932.
- (d) February, 1931, to June, 1932. Grant terminated June 30, 1932.
- (e) For six months. Grant terminated December 31, 1931.
- (f) Investigations also aided by grant from Ministry's funds (see Table V).
- (g) For eleven months. Grant terminated June 30, 1932.

(Table VII.—See page opposite.)

TABLE VIII.—RESEARCH SCHOLARSHIPS AND STUDENT-SHIPS IN ANIMAL HEALTH.

AWARDED JULY, 1932.

	<i>Name.</i>	<i>Subject.</i>	<i>Institute to which assigned.</i>
(a) Scholars			
	Miss G. M. Herford	Entomology	Imperial College of Science and Technology
	J. L. Russell	Soil Science	Leipzig University (six months) and Friedrich Wilhelms University, Breslau (six months)
(b) Students			
	G. Slavin	Veterinary Science	Ministry's Veterinary Laboratory, Weybridge
	E. G. White	do.	University College, London

TABLE VII.—GRANTS FROM DEVELOPMENT FUND TO ADVISORY CENTRES.

Advisory Centre	1930-31				1931-32			
	General Advisory	Economics	Dairy Bacteriology	Total	General Advisory	Economics	Dairy Bacteriology	Total
Armstrong	£ 3,200	£ 1,480	£ 400	£ 5,080	£ 3,150	£ 1,430	£ 320	£ 4,900
Bristol ...	5,150	1,900	400	7,450	4,970	1,840	390	7,200
Cambridge ...	4,620	2,350	450	7,420	4,450	2,300	450	7,200
Harper Adams	*3,190	1,500	380	5,070	*3,110	1,460	380	4,950
(Dairy Rationing Officer)	—	—	—	1,600	—	—	—	—
Leeds ...	2,000	1,100	—	3,100	1,900	1,050	—	2,950
Liverpool	—	—	—	—	—	—	—	—
(Veterinary Adviser)	980	—	—	980	850	—	—	850
Manchester ...	2,150	1,460	—	3,610	2,150	1,450	—	3,600
Midland	*3,250	1,500	400	5,150	*3,150	1,450	400	5,000
Oxford...	2,610	—	—	2,610	2,550	—	—	2,550
Reading	3,430	1,520	400	5,250	3,380	1,470	400	5,250
Seale-Hayne	3,700	1,486	380	5,566	3,600	1,470	380	5,450
Wye ...	4,633	1,670	480	6,783	4,450	1,620	480	6,550
Aberystwyth ...	2,850	2,705	490	6,045	2,760	2,620	490	5,870
(Grassland Adviser)	850	—	—	850	830	—	—	830
Bangor	5,130	—	390	5,520	4,970	—	380	5,350
Cardiff ...	2,750	—	—	2,750	2,650	—	—	2,650

* Includes part only of the cost of the Veterinary Adviser, the College providing the remainder.

WINTER SPRAYING TRIALS AGAINST THE APPLE CAPSID BUG ON MIXED VARIETIES OF APPLE TREES

R. A. HARPER GRAY, M.A., M.Sc.,
Armstrong College, Newcastle-on-Tyne,
and

H. E. BROOKS, N.D.H.,
Cumberland and Westmorland Farm School, Cumberland.

IN 1929 signs of appreciable damage by the Apple Capsid Bug (*Plesiocoris rugicollis*) were observed on the leaves and fruit in the orchard attached to the Farm School, Newton Rigg, Cumberland, and the damage showed a progressive increase in the following two years, whilst in other parts of the county apple trees appeared to be free from obvious Apple Capsid damage. It seemed likely, therefore, that unless the infestation were checked in this localized centre, it might spread to other orchards in the district.

The trees were carefully examined in 1930 and 1931, and in the latter year Apple Capsid Bugs were first observed to hatch out on May 12. As the attack showed in summer an increase in intensity as compared with that of the previous year, it was decided to carry out winter spraying of the trees with various washes in order to test their comparative values in killing Capsid eggs, and so reducing the damage in 1932. Eggs were numerous in apple twigs collected in January, 1932, in which month spraying was begun.

The Orchard and the Washes Used.—The trees, planted 18 feet apart in 1923 in nine rows, are grown on an area of about $2\frac{1}{4}$ acres, the soil being a heavy loam, containing clay. The orchard is wind-swept and cold. Such varieties as Bramley's Seedling, Newton Wonder, Allington Pippin and Lord Derby have grown well, whereas Rival and James Grieve have given very poor results. The latter suffers much from Canker, and is not included in the trials. Fruit bushes are not grown under the trees.

The following are the varieties given in their order for each of the nine rows A to I:—

- (1) Bramley's Seedling, (2) Lane's Prince Albert, (3) Worcester Pearmain, (4) Newton Wonder, (5) Allington Pippin, (6) Early Victoria, (7) Lord Derby, (8) Rival, (9) Worcester Pearmain, (10) Bramley's Seedling, (11) Rival, (12) Newton Wonder, (13)

WINTER SPRAYING AGAINST APPLE CAPSID

Early Victoria, (14) Lane's Prince Albert, (15) Grenadier,
(16) Cutler Grieve.

The trials were so arranged that the varieties of apple trees in each row received the same mixed wash, except those in two rows (C and F) which were unsprayed and used as "Controls." The trials, therefore, were designed to determine the average result of each spray on rows of different varieties. The washes used were:—

Row A.	Proprietary mixed wash	..	10%	applied Jan. 30.
" B.	Proprietary mixed wash	..	7½%	" Jan. 30.
" C.	Not sprayed ("Control").			
" D.	Tar distillate .. ..	..	5%	} " Feb. 2.
	Mineral-oil emulsion .. ..	..	7½%	
" E.	Tar distillate .. ..	..	5%	} " Feb. 2.
	Mineral-oil wash .. ..	..	5%	
" F.	Not sprayed ("Control").			
" G.	Tar distillate .. ..	..	5%	" Feb. 1.
	Mineral-oil emulsion .. ..	..	7½%	" March 14.
" H.	Tar distillate .. ..	..	5%	} " Feb. 27.
	Mineral-oil emulsion .. ..	..	5%	
" I.	Proprietary mixed wash	..	5%	" Feb. 3.

The "proprietary mixed wash" consisted of 2 parts mineral-oil emulsion mixed with 1 part Long Ashton modified tar-oil wash, as supplied by the makers.

On June 2 an examination of the shoots showing blossom trusses was begun by counting the number of trusses from which Apple Capsids were disturbed when a shoot was shaken over a white sheet. Twenty or more shoots on each tree in a row were chosen at random, and a note was made of those that contained Apple Capsids, and that at the same time showed capsid damage on the leaves or blossom. By this method it was possible to arrive at a comparative estimation of the percentage of attacked shoots over the trees in each row. As over 3,000 counts were made, only the percentage for each row is given in Table I.

TABLE I.—MARKED BLOSSOM SHOOTS.

Row.	Sprays.	Percentage of Marked Blossom Shoots.				
A.	Prop. mixed 10%	..	..	..	..	21.5
B.	Prop. mixed 7½%	..	..	..	..	25
C.	Control (unsprayed)	..	..	..	..	43.6
D.	Tar distillate 5%	}	..	..	..	5
	and mineral oil 7½%					
E.	Tar distillate 5%	}	..	..	..	9.6
	and mineral oil 5%					
F.	Control (unsprayed)	..	..	..	..	51.4
G.	Tar distillate 5% (1st Feb.)	}	..	..	..	20.5
	Mineral oil 7% (14th March)					
H.	Tar distillate 5%	}	..	..	..	9
	and mineral oil 5%					
I.	Prop. mixed 5%	..	..	..	..	28.7

WINTER SPRAYING AGAINST APPLE CAPSID

The unsprayed rows C and F show an appreciably larger percentage of attacked blossom shoots than any of the sprayed rows. In other words, the results for the sprayed trees indicate that all the washes were effective to a greater or less extent in bringing about a general reduction of Apple Capsids. These results are somewhat erratic when compared with figures that were obtained later for marked *fruit* in the rows, but this might be expected to occur in rows of mixed varieties of apples showing considerable variation in yield of crop. In the control rows there was much variation in intensity of attack, even in trees of like variety. Further, it is not suggested that the above results represent percentages corresponding to those subsequently obtained for the marked fruits.

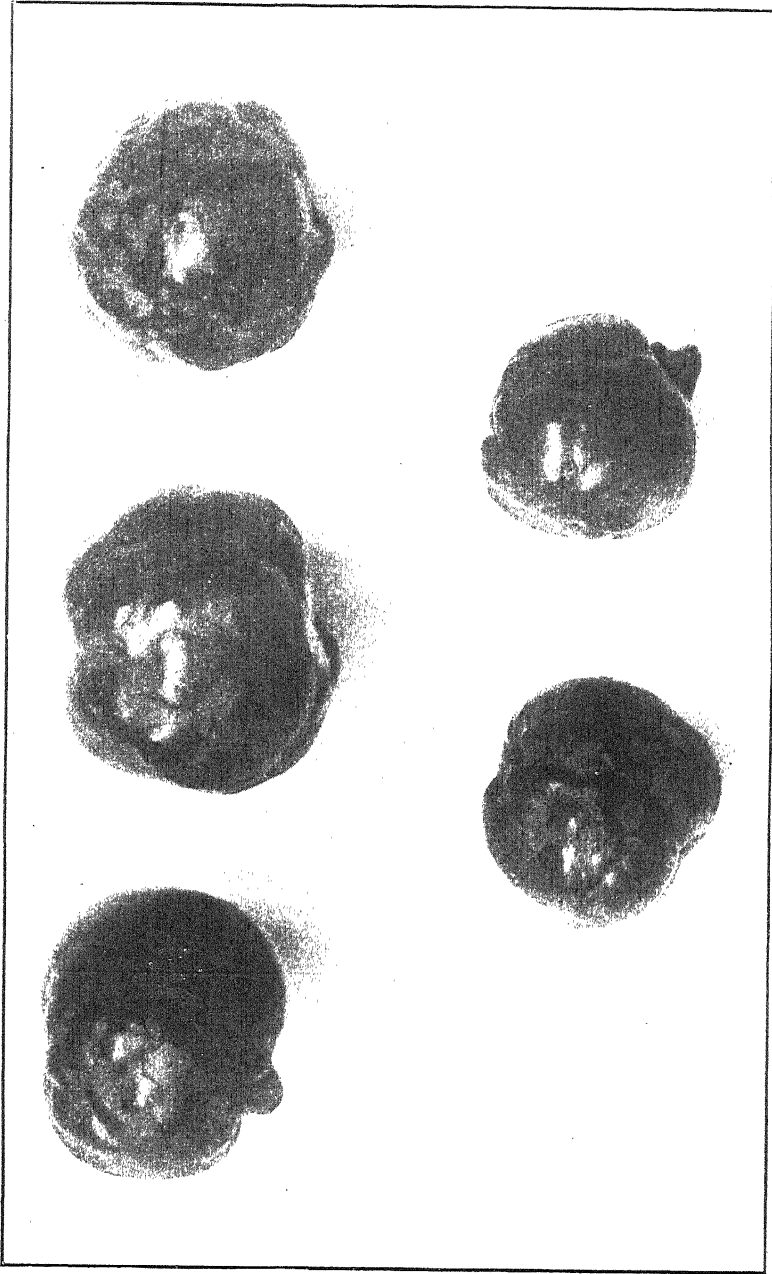
When the apples were gathered in September, a note was made of the total yield from each tree in the orchard and, out of each total, the number showing capsid damage. As the trials were concerned with the general effects of the washes over different varieties, a note was made also of the total numbers for each row, as well as the percentages of marked fruit for each row.

A review of these results for the orchard as a whole showed that the proprietary mixed wash at 10 per cent. concentration, and the tar distillate mixed with mineral oil at $7\frac{1}{2}$ per cent. gave an efficient commercial control, the total percentage of marked apples in the rows concerned being 2.2 for row A and 2.8 for row D.

Rows E and H, which received the same washes as row D but with only 5 per cent. concentration of mineral oil, also gave a good control, the numbers being 5.9 for row E and 4.3 for row H. Row E was sprayed on February 2, row H on February 27, and the resulting percentages of marked apples seem to indicate that the tar distillate wash with mineral oil at a higher concentration might be slightly more effective if put on late.

In row G, the mineral oil at $7\frac{1}{2}$ per cent. was applied separately in March, but the resulting control over the varieties as a whole, the percentage of marked fruit being 7.5 per cent., was not so good as when applied along with tar distillate in row D. Petherbridge and Hey* have stated that late applications of proprietary mineral-oil emulsions at a concentration of $7\frac{1}{2}$ per cent. "or rather higher," have given the best control of the Apple Capsid Bug, and

* This JOURNAL, Feb., 1931, p. 1086.



Apples from unsprayed trees, showing damage done by Apple Capsid Bugs.

WINTER SPRAYING AGAINST APPLE CAPSID

probably the results of row G might have been still better had mineral oil at a higher concentration than $7\frac{1}{2}$ per cent. been used.

The proprietary mixed wash applied to rows B and I in the strengths shown, gave a fair control, 7.8 per cent. "marked" for row B and 12.6 per cent. for row I, but not equal to that obtained by applying this wash at 10 per cent. concentration.

The percentages for the Control rows C and F were respectively 52.6 and 22.9.

In further reference to the results obtained for the orchard as a whole, we would point out that the crops on several rows were poor. For comparison, therefore, the results for four of the varieties showing fair average yields are given separately in Table II. In all four the proprietary mixed wash at 10 per cent. and the tar-distillate at 5 per cent. mixed with mineral oil at $7\frac{1}{2}$ per cent. show an efficient control—especially on Early Victoria, Lord Derby and Grenadier. Tar distillate at 5 per cent. concentration and mineral oil at $7\frac{1}{2}$ per cent. applied separately on different dates show good control, especially on Early Victoria and Lord Derby. The results for Allington show somewhat higher percentages of marked apples, and would seem to indicate that on this variety the various washes were less effective. The results, however, for these four varieties taken singly agree in a general way with those that were obtained for all the varieties in each row, and they may be taken to indicate the washes that might be most effective in controlling the Apple Capsid Bug in an orchard of mixed varieties of apples such as are included in each of the trial rows.

General Observations.—(1) The results obtained for each row in these trials may be taken to represent what might be expected by treating an orchard containing mixed varieties of apple trees, seeing that each wash was applied to a row containing trees, not of one variety, but of several varieties.

(2) Very few Aphides and Apple Suckers were present on the shoots of sprayed trees examined in June, and only occasionally a Winter Moth larva was seen damaging leaves. On the other hand, these insects were present in fair numbers on the unsprayed rows.

WINTER SPRAYING AGAINST APPLE CAPSID

TABLE II.—RESULTS FOR EACH OF FOUR VARIETIES GIVING FAIR AVERAGE YIELD.

Variety.	Key No.	Washes and Dates of Spraying.	Wt. in lb.	% Clean.	% Marked.
Early Victoria	A6.	Prop. mixed 10% (Jan. 30)	50	96.9	3.1
	B6.	Prop. mixed 7½% (Jan. 30)	25	96.7	3.3
	C6.	Control (unsprayed)	28	13.2	86.8
	D6.	Tar distillate 5%			
		Min. oil emulsion 7½% (Feb. 2)	38½	97.4	2.6
	E6.	Tar distillate 5%			
		Min. oil emulsion 5% (Feb. 2)	23½	90.6	9.4
	F6.	Control (unsprayed)	12½	73.7	26.3
	G6.	Tar distillate 5% (Feb. 1)			
		Min. oil emulsion 7½% (Mar. 14)	17½	96.4	3.6
	H6.	Tar distillate 5%			
		Min. oil emulsion 5% (Feb. 27)	34½	100	0
Lord Derby	I6.	Prop. mixed 5% (Feb. 3)	38	96.4	3.6
	A7.	Do.	26¾	97.2	2.8
	B7.	Do.	19½	79.1	20.9
	C7.	Do.	1½	0	100
	D7.	Do.	13½	96.2	3.8
	E7.	Do.	8	84.9	15.1
	F7.	Do.	2½	0	100
	G7.	Do.	21¾	97.8	2.2
	H7.	Do.	13¼	82.7	17.3
	I7.	Do.	16	76.7	23.3
Grenadier	A16.	Do.	7	100	0
	B16.	Do.	19	77.8	22.2
	C16.	Do.	5	23.1	76.9
	D16.	Do.	16	100	0
	E16.	Do.	22	90.1	9.9
	F16.	Do.	¾	33.3	66.7
	G16.	Do.	23½	80.0	20.0
	H16.	Do.	2¼	100	0
	I16.	Do.	No crop	—	—
	A5.	Do.	5	91.7	8.3
Allington	B5.	Do.	25	22.9	7.1
	C5.	Do.	1¼	0	100
	D5.	Do.	9	80	20.0
	E5.	Do.	22	90	10.0
	F5.	Do.	No crop	—	—
	G5.	Do.	6	82.5	17.5
	H5.	Do.	13	82.5	17.5
	I5.	Do.	2½	72.7	27.3

(3) The yield varied greatly amongst the trees, a condition that was probably due rather to seasonal influence and to the presence of canker on some varieties, than to the effect of capsid attack.

(4) There was no definite evidence that any of the washes at the strength used destroyed the buds or retarded fruiting.

(5) The appearance of the foliage of the sprayed as compared with the unsprayed trees was greatly improved—an effect that has been noted by other observers.

WINTER SPRAYING AGAINST APPLE CAPSID

Conclusions.—(1) The results indicate that though washes applied in winter against the eggs of the Apple Capsid Bug may be effective on many sorts of apple, there is a good deal of variation in their efficiency over an orchard containing many different varieties of apple trees.

(2) In these trials the washes that gave the best general control over capsid damage were (a) a proprietary mixed wash at 10 per cent. concentration, and (b) a tar-distillate wash at 5 per cent. mixed with mineral-oil emulsion at $7\frac{1}{2}$ per cent. (*vide* Table II). By reducing the mineral-oil emulsion to 5 per cent. concentration the effectiveness of this along with the tar-distillate was reduced, as shown in Table II (rows E and H). The proprietary mixed wash also gave a less efficient control at a concentration below 10 per cent. (*vide* rows B and I in Table II).

(3) The numbers of damaged blossom shoots are not necessarily a guide to the amount of damage likely to appear on the ultimate fruit. Observations made during the trials seem to show that even when shoots are moderately highly attacked by the Apple Capsid Bug after winter spraying, and when the yield of apples is relatively large, the number of marked apples may be comparatively small. When, on the other hand, the crop is small, the percentage of marked fruit may be high, even when relatively few shoots have shown damage from the Apple Capsid Bug.

THE EMPIRE MARKETING BOARD AND AGRICULTURAL RESEARCH IN ENGLAND AND WALES

IN the seventh Annual Report of the Empire Marketing Board, covering the year May, 1932, to May, 1933,* considerable space is again devoted to the grants made by the Board for research work. The following is a brief account of some of the experiments carried out with the help of grants made by the Board to research institutions in England and Wales, most of which are administered by the Ministry on behalf of the Board.

Storage and Preservation Problems.—The work at the Research Stations engaged upon the investigation of various aspects of these problems described in this JOURNAL for September, 1932, has been continued during the year 1932-33—i.e., low-temperature research at Cambridge and at the Ditton Laboratory, East Malling; research into the preservation and transport of fish at Aberdeen; and experiments upon the effect of certain orchard factors on the storage questions of fruit.

Veterinary Research.—Three major problems of importance both to this country and other parts of the Empire, viz., contagious abortion of cattle, fowl paralysis, and coccidiosis of poultry, urgently required the co-operation of a chemist with a special type of training and experience, and accordingly Dr. H. A. Green was appointed for one year as Biochemist at the Veterinary Research Laboratory of the Ministry of Agriculture and Fisheries at Weybridge, where these problems are being investigated.

Bacteriological Technique of Milk Examination.—Considerable progress has been made at the London School of Hygiene and Tropical Medicine with an investigation begun in October, 1931, into the bacteriological technique of milk examination, one of the most important developments being the devising of a new medium, which has given very promising results both at the London School of Hygiene and Tropical Medicine and at the National Institute for Research in Dairying at Reading.

* *Empire Marketing Board, May, 1932, to May, 1933.* E.M.B. 63. Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price 1s. (post free 1s. 3d.).

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Poultry.—Nutrition.—At the request of the Imperial Institute, the possible use of palm oil as a mutton fat substitute for fattening hens received attention at the Poultry Nutrition Section, Animal Nutrition Institute, University of Cambridge. The results have proved favourable to the use of this material in fattening rations, neither the quality of the carcass, nor its palatability or flavour being adversely affected.*

Table Poultry.—Experiments carried out with table chickens at the National Institute of Poultry Husbandry, led to the following conclusions:—

- (i) That slipped tendons and allied leg disorders in battery-reared chicks are due to an improper balance of calcium and phosphorus in the food;
- (ii) that with proper feeding and management battery-reared birds gave as good growth-results as floor-brooded chicks; and
- (iii) that in confirmation of the observations made at the Hillsborough Experimental Station, Northern Ireland, chickens fed on very good rations leave little scope for an intensive period of fattening

Further experiments are in progress to determine the most economic methods of rearing and fattening chickens.

Egg-quality Studies.—In a survey of all eggs produced on the National Institute plant, no correlation could be traced between the quality of egg-white and the character of the different rations fed. Some evidence was obtained that quality of egg-white is more specifically an individual characteristic than a condition induced by nutritional factors.

Virus Diseases of Plants.—Rothamsted Experimental Station.—By the use of collodion membranes of known and graduated pore size, it has been found possible to determine, on the one hand, the size of pore through which a particular virus can pass, and on the other, the size which prevents it from passing. The method allows, in some instances, of the separation of two viruses occurring mixed in nature. A rapid and convenient method of determining the quantity of virus contained in a sample of plant juice has been developed by the use of a necrotic-spot technique, the number of spots varying directly with the concentration of virus. For the first time a method has been discovered of producing in the living non-virus plant, intracellular inclusions that are indistinguishable from those produced by virus. This consists in supplying the plant with a salt of

* See Bulletin of the Imperial Institute, 1933, 30, 312.

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molybdenum, and up to the present no other substance has been found to give the same results. The artificial lengthening of the day during the winter months, referred to in the previous report of the Board (p. 49), continues to prove thoroughly satisfactory.

Experimental and Research Station, Cheshunt.—During 1932 tomato plants suffering from Spotted Wilt were received, for the first time, from widely-separated localities in Great Britain. The disease was studied and found to be identical with the Spotted Wilt of Australia, but distinct from the Mosaic and Stripe diseases of tomato of this country. Clean cultural methods and the eradication of Thrips are emphasized as control measures. There is a danger of the diseases over-wintering in dahlias and chrysanthemums. Experiments with treatments calculated to improve infected plants have not given conclusive results, but some success has been obtained in nurseries by methods that increase the rate of vegetative growth.

Investigation of tomato diseases of the Mosaic, Stripe and Streak group, and of the effect of the virus of Aucuba Mosaic of tomato on the metabolism of affected plants from the time of inoculation up to the appearance of severe mottling, have been continued.

In view of the greater prevalence and severity of Mosaic disease of tomatoes in certain parts of one and the same house, investigations are in progress to determine the relation between soil conditions and the incidence and extent of tomato Mosaic.

Plant Breeding. —*Welsh Plant Breeding Station, Aberystwyth.*—Further progress has been made towards a better understanding of the proper methods for growing remunerative seed crops on a field scale, as applied to different types of pedigree grasses. Two aims have been kept constantly in view:—

(a) to increase the yield of seed, and

(b) to reduce the cost of production.

Problems peculiar to indigenous grasses in connexion with the dressing of their seeds have been investigated, and appropriate machinery has been designed to overcome various difficulties.

Preliminary studies have been initiated by resort to a new technique in order to measure the efficiency of distance

isolation for seed production in the case of both cross-fertile grasses and clovers.

The work on delayed establishment in some species of grasses is being continued, and important results from these investigations have been published. Arising out of this work the Station has commenced an investigation into the relations between the mineral nutrition of grass-seedlings and their reaction to diminished illumination.

A detailed study has been made of the exact manner in which soaking the "seeds" of cocksfoot in water causes an acceleration of germination. It is hoped to publish this work in the immediate future.

Further experiments are being conducted on the germination of grass "seeds" in solutions of cane sugar ("suction-force" determinations), but little material is available that is suitable for this purpose.

The work on peaty hill soils is continuing; it is probable, however, that another season's growth will be required (making three years' growth in all) before a definite account of the results can be provided.

The investigations that have been in progress for some time on the occurrence of buried weed seeds in the soil underlying pastures of various types have been continued, and a report on the first batch of fields investigated will be published at an early date.

Horticulture.—*East Malling Research Station, Kent.*—During the present season some 26,000 rootstocks, as well as several sets of budded trees, have gone out from East Malling for experimental purposes to the Dominions and India. Some 1,000 trees of Mackintosh Red and Fameuse are now ready in the East Malling nurseries, upon both layered and selected seedling roots, to test out, in collaboration with the Dominion Horticultural Experimental Farms, the behaviour of these trees in eastern and western Canada. The nursery trade at home has absorbed over 200,000 rootstocks this season.

The exchange of workers between Summerland, British Columbia, and East Malling carried the propagation side of the rootstock problem a stage further. Mr. R. C. Palmer, of British Columbia, carried out some intensive nursery trials at East Malling with root cuttings in collaboration with the Statistical Section, and Mr. W. S. Rogers, of East Malling, whilst in Canada, was able to overcome propaga-

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tion difficulties previously encountered there by suggesting modifications of layering methods in order to adapt them to local conditions.

The soil moisture recording instrument is still in process of development and offers a further aid to the study of soil and root problems.

The breeding and testing of a wide range of Woolly-Aphis-immune apple stocks, in collaboration with a geneticist at the John Innes Horticultural Institution, Merton, have been greatly accelerated. Approximately 1,000 seedlings can now be tested annually, and some of the more recent crosses promise to give a proportion of immune material as high as 50 per cent. from which to select.

Considerable progress has been made in demonstrating practical methods for the establishment of healthy clonal races of raspberries and strawberries.

A further series of experiments on the causes of a certain form of strawberry "degeneration" has established the existence in this country of a virus disease that causes a rapid loss of vigour leading to the sterility and death of infected plants and their runner progeny. A review of the previous work on the chief "degeneration" diseases at home and overseas has been prepared. Investigation of measures for the commercial control of the disease, the multiplication of healthy clones and the selection of optimum runners has been inaugurated; and the relation of the important Tarsonemid Mite of the Strawberry to this disease, in conjunction with which it is so commonly found, has been followed up.

Long Ashton Agricultural and Horticultural Research Station.—The results obtained in the storage experiments and chemical investigations have suggested the importance of "maturity" in connexion with the effects of certain orchard and pre-storage conditions on storage qualities. Following these indications, extensive investigations have been carried out with the object of examining maturation processes of the fruit on the tree and in the store, and in an attempt to relate the effects of the orchard factors, grass and arable culture, potassium deficiency, fruit thinning and bark ringing to these processes.

Attempts have also been made to alter the vitamin C content of apples by certain cultural practices. Using the varieties Bramley's Seedling, which is relatively rich in the

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vitamin, and King Edward VII, which has an especially low vitamin content, it has been found possible to increase the vitamin content significantly in every case, and by as much as 100 per cent. in certain instances, by reducing the nitrogen content of the fruits by means of grass culture and bark ringing. No difference in vitamin content was found between large and small apples graded out from a single crop.

Experiments were made to determine whether soil moisture is of importance in the problem of Bitter Pit in apples. Two series of apple trees are grown in pots under high and low soil moisture conditions respectively, and housed in a specially designed glass orchard house to protect the trees from rain. During 1932, there occurred a series of heat waves that resulted in very high temperatures in the glass shelter. As a result, severe outbreaks of "Cork" and Water Core occurred almost immediately, and, after picking, a large proportion of the sound fruits developed Bitter Pit. The results indicate that high temperature is probably the most potent factor in the development of "Cork," Water Core and Bitter Pit, but that soil moisture may also play an important role.

Comparative Study of Methods of Soil Analysis.—

The Report on the comparative study of methods of soil analysis, carried out with a grant from the Board at the University College of North Wales, was completed in December, 1932. It has been issued by the Imperial Bureau of Soil Science in its series of Technical Communications.*

* "The Dispersion of Soils in Mechanical Analysis." Technical Communication No. 26 of the Imperial Bureau of Soil Science. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price 2s. (post free 2s. 1d.)

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Regulation of Imports.—(i) *Oats and Oat Products.*—An Order was issued on August 30, under which imports of oats and oat products (including oatmeal) from foreign sources became subject, on and after September 5, 1933, to an additional duty of 10 per cent. *ad valorem*, making a total of 20 per cent. in all. In order that the protection thus afforded to home producers may not be prejudiced by imports from Canada, the Canadian Government increased to use their best endeavours to limit exports have agreed to the United Kingdom during the twelve months from August, 1933, to a figure not exceeding, in the case of oats, approximately the average of Canadian exports in the last two cereal years, and to a figure, not exceeding in the case of oat products, including oatmeal, the average of the case of oat exports to this country in the last two calendar years.

The arrangement as to Canadian imports will be the subject of further consultation with the Canadian Government before the end of August, 1934.

(ii) *Potatoes.*—During August, the Minister received a deputation from the potato industry. The deputation, led by Mr. B. J. Gates, the President of the National Farmers' Union, represented that the marketing situation was serious and called for immediate action, the acreage under potatoes this year being the highest since 1922 and the crop prospects good. There was, however, a lack of confidence among those engaged in the industry, reflected in the low prices obtainable. The deputation emphasized the necessity for temporary control of imports, particularly having regard to the fact that the duty on foreign supplies would fall from £2 to £1 per ton on September 1. The Minister undertook to go fully into the matter forthwith, and he has since been in negotiation with representatives of potato-exporting countries, with the object of emergency action for the regulation of imports pending the coming into operation of the home marketing schemes and of a permanent system of import regulation. As a result of these negotiations, it has been arranged that, during the four months September to December, imports into the United Kingdom from the Netherlands will not exceed 8,000 tons, distributed as evenly as possible over

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the period, while imports from Belgium will not exceed 250 tons. Other foreign exporting countries, which do not usually export potatoes to the United Kingdom market at this time of year, have been asked to refrain from doing so for the remainder of the year.

Mr. Skelton, Parliamentary Under-Secretary for Scotland, speaking at Megginch, Errol, Perthshire, on September 9, made special reference to the situation in the potato industry, and to the arrangement for the regulation of imports. During the course of his address, he said it was perhaps not generally known that potato-crisp manufacturers and chip fryers required a special type of potato—a yellow-fleshed variety—which could be obtained only from the Continent. Statistics of imports in past years showed that, although imports of main crop potatoes were heavy only when home supplies were short and prices were remunerative, there was nevertheless a small trickle of imports even in the years when the home crop was heavy. This was the explanation of the fact that, under the arrangements which the Government had made, a small importation from the Netherlands and Belgium was to be permitted. He was glad to learn, however, that trial crops of yellow-fleshed varieties had been grown in this country this season, and he hoped that in the near future home growers would be in a position to meet the whole of this special demand.

(iii) *Processed Milks*.—In the July issue of this JOURNAL (p. 365), it was announced that, in view of the production and accumulation in this country of large supplies of processed milks, discussions had taken place between the Minister of Agriculture and Fisheries and representatives of the Governments of countries concerned in the export of condensed milk, cream, and milk powder to the United Kingdom, as a result of which an agreement had been reached for the regulation of exports of these products to this country during the three months June, July and August.

It has now been proposed that during the four months September to December, 1933, exports of condensed whole milk, condensed skimmed milk and milk powder to the United Kingdom from the principal foreign exporting countries shall be limited to 80 per cent., while imports of cream (the market for which is of special interest to the home milk industry) shall similarly be limited to 75 per cent. of the quantities sent during the corresponding period of 1932. As before, it is proposed that imports of these

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products from foreign countries with smaller interests in the United Kingdom market shall be limited to the quantities shipped by them in the corresponding months of last year, while the Governments of the oversea Dominions concerned have been asked to continue to use their best endeavours to secure a "standstill" in shipments to the United Kingdom.

Formal agreement to these proposals has been intimated by most of the foreign Governments concerned. The arrangements are subject to review at the end of each month.

Pigs and Bacon Marketing Schemes : Prices of Bacon Pigs.—It was originally intended that the contract system of sale of pigs to curers should be introduced almost concurrently with the commencement of the marketing schemes for pigs and bacon under the Agricultural Marketing Act, 1931. These schemes came into operation on September 10. It afterwards became evident that administrative difficulties connected with the registration of contracts would prevent contract sales commencing before November 1. In order to give pig producers the advantage of the agreed contract prices at the earliest possible date, an arrangement has been agreed between the Pigs Marketing Board and the Bacon Marketing Board, under which the former Board will prescribe, and curers will pay, for all bacon pigs bought by them during the period September 15 to October 31, 1933, the prices agreed as the contract prices for bacon pigs. This means that, provided the price of the agreed basic ration of feeding-stuffs remains at the present level, the prices of pigs (other than black or mainly black) will be as follows:—

	<i>Per Score.</i>
7 score to 8 score 10 lb. (inclusive) deadweight ..	12s. 0d.
8 score 11 lb. to 9 score 10 lb. „ „ ..	11s. 6d.
9 score 11 lb. to 10 score 10 lb. „ „ ..	11s. 0d.
10 score 11 lb. to 11 score „ „ ..	10s. 6d.

For pigs weighing over 11 score there will be a deduction of 6d. per score on the full deadweight of the pig for each 10 lb. or part of 10 lb. in weight over 11 score, but this deduction will not be made from the price unless the curer, before buying the pig, has notified the producer that he is not desirous of buying pigs over 11 score.

Black or mainly black pigs will be paid for at 6d. per score less than the above prices.

The prices mentioned are not applicable to pigs suffering from certain specific defects.

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From the price of every pig the curer must deduct 1s. 5d., of which 3d. will be expended by him in insuring against certain risks, and the balance will be remitted to the Pigs Marketing Board.

This arrangement was facilitated by the decision of the Minister to negotiate for a further reduction in imports of bacon and hams as from September 15, notwithstanding that the contract system will not come into full operation until November 1.

The Pigs Marketing Board have appointed Mr. J. Henry as their secretary and general manager. The posts of accountant, registrar and statistician, and chief marketing officer have also been filled, by the appointment of Mr. R. R. Ker, Mr. R. P. Finch, and Mr. N. Crombie, respectively.

The Bacon Marketing Board have appointed Mr. M. R. Welsh as secretary.

Milk Marketing Scheme.—The result of the poll on the question whether the Milk Marketing Scheme should remain in force was declared on September 6. 96.42 per cent. of the registered producers voting (representing 96.61 per cent. of voters' productive capacity) declared in favour of the scheme. The necessary majority having been obtained, the scheme will come into full operation on October 6.

The Milk Marketing Board, who have now taken over permanent offices at Thames House, Millbank, S.W.1, have appointed Mr. Sidney Foster as manager. Mr. Foster was formerly manager of the London Co-operative Society. Other appointments made by the Board are:—Secretary, Mr. D. P. Oliver; Marketing Officer, Mr. A. E. Magee; Registrar and Statistician, Mr. C. Mead.

Amendment of the Hops Marketing Scheme, 1932.—The public inquiry into objections to the amendments proposed by the Hops Marketing Board opened at the Law Courts on September 11 and closed on September 14. The inquiry was held by Mr. F. M. Russell Davies, K.C.

Wheat Act, 1932.—Certificates lodged with the Wheat Commission covering wheat sold from the commencement of the cereal year on August 1 up to and including September 15 indicated sales of 2,739,673 cwt. of millable wheat.

Loans to Marketing Boards.—Applications from the Pigs, Bacon and Milk Marketing Boards for further loans from the Agricultural Marketing Fund to provide for expenditure in connexion with the initial working of the

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schemes have been considered by the appropriate Agricultural Marketing Facilities Committees. On the Committees' recommendations, the Minister has approved loans as follows:—

Pigs Marketing Board	£4,300
Bacon Marketing Board	£1,350
(plus expenditure in respect of legal and accountancy charges, not exceeding £400).	
Milk Marketing Board	£13,750

Reorganization Commissions for Eggs and Poultry.

—The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have decided to set up Reorganization Commissions under the Agricultural Marketing Act, 1931, to prepare schemes for the marketing of eggs and poultry in England and Scotland respectively. It is also the intention to appoint from the members of these Commissions a Reorganization Commission for Great Britain, which will be charged with the duty of investigating the manner in which the operation of the English and Scottish schemes can be facilitated (i) by co-operation between the Boards administering them, and between them and any corresponding body in Northern Ireland, and (ii) by the regulation of imports as contemplated in the Agricultural Marketing Act, 1933.

The names of the Chairmen and members of these Commissions will be announced as soon as possible.

National Mark Canned Fruit and Vegetables.—The following firms have recently been authorized as National Mark canners:—

Beaulahs (King's Lynn) Cannery Ltd., King's Lynn.
Avon Vale Canning Co., Ltd., Bidford-on-Avon.
T. H. Brunt, Shropshire Cannery, Baschurch.

Two canners already authorized are operating additional factories at King's Lynn and Louth, and these premises have been approved for the packing of National Mark canned produce.

A feature of the season 1933 was the early ripening of crops, resulting in the overlapping of deliveries of different fruit. In one extreme case, gooseberries, strawberries, raspberries, loganberries and cherries were all being canned on the same day. Strawberries and plums tended to be smaller than usual, and in some instances it was difficult to comply with the provisions as to minimum sizes pre-

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scribed in the scheme for these fruits. The pea pack was satisfactory, though weather conditions led to a short season and the factories experienced trouble in canning peas at the right stage of maturity.

In accordance with the recommendations made by the National Mark Canned Fruit and Vegetables Trade Committee for ensuring that only first-class produce shall be sold under the National Mark, the control over the canning operations in factories has been strengthened. Frequent visits have been made to all factories to check the quality of the raw fruit being canned, the efficiency of factory supervision and the quality of the finished product.

Generally speaking, stricter standards of quality for raw fruits have been adopted by canners and, in consequence, many consignments of unsuitable fruit were refused. The intensive sampling of cans of the finished product—reports having been made on over 1,600 samples examined at Campden Research Station—resulted, in a number of instances, in the firms concerned deciding not to apply the National Mark to the doubtful packs. The application of a daily lid-mark to the cans was found to be satisfactory and was helpful in tracing and segregating packs that, as examination showed, were not up to standard and from which the National Mark could be withdrawn. The suggested standards for size-grades and weight of fruit in cans were widely accepted by the canners and contributed to the general improvement in quality.

To indicate more accurately the result of the examination of samples, a system of scoring was adopted, whereby a number of points were awarded for each of the essential items, such as grading, texture and weights. The scores attained were promptly communicated to the canners from whom the samples were collected. Authorized canners have expressed their satisfaction with this new system of scoring, which has afforded them further assistance in maintaining efficient factory control.

An increased demand for canned home products can be secured if they are of guaranteed high quality and compare favourably with imported supplies of the same or alternative products. A satisfactory fruit pack involves rigorous factory control, including a searching scrutiny of all supplies of raw fruits. The receipt of large quantities of undergrade fruit at the cannery tends to upset a canner's calculations as to the size of his packs and to

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create difficulties between canner and producer. The canning of inferior fruit would speedily be reflected in a reduced consumer-demand, with a consequent lower demand for the grower's produce. The remedy would seem to lie with the growers, for whose guidance canning grades of fruit have been suggested in Marketing Leaflet No. 20, copies of which may be had free on application to the Ministry. Ultimately, it is much to the grower's advantage to supply fruit of the right quality, in sound condition and packed in such manner as to ensure the minimum of damage to the fruit in transit. This is one of the important factors on which depends the future expansion of the industry.

National Mark Flour at the Bakers' and Confectioners' Exhibition, 1933.—In the British Wheat Flour Competition held at this Exhibition, the Class for All-English Yeoman Wheat Flour milled to National Mark standards attracted 14 entries from authorized miller-packers in the National Mark scheme. The Ministry offered gold, silver and bronze medals and diplomas to the winning entrants and the judges' awards were made as under:—

Gold Medal and Diploma—Messrs. Green Bros., Raleigh Flour Mills, Maldon, Essex.

Silver Medal and Diploma—Messrs. Clark & Butcher, Ltd., Soham, Cambs.

Bronze Medal and Diploma—Messrs. Cadge & Colman, Peterborough.

The wheat used in milling the flour that secured the first place was supplied by S. Edward Ratcliff, Brick House, Maldon, Essex, to whom a gold medal has also been awarded by the Ministry.

The judges remarked that the wheat and flour entries were this year much more even in quality than previously, and that the general level indicated that packers as a whole were attaining a progressively higher standard of quality.

The test loaves made under commercial conditions from the various lots of flour entered also showed a greater measure of uniformity this year. Those made from *National Mark (Yeoman) Straights* flour in this class were noticeably bigger and bolder than the corresponding loaves made from Yeoman Patents entered in another class.

Accounts of National Mark Egg Packing Stations.—Certain National Mark egg packing stations have provided the Ministry with detailed records of their costs and returns for the years 1929-32, and the data have been

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collated and examined in a leaflet* recently issued by the Ministry.

Costs are classified and compared under the headings of collection, grading and packing, distribution and administration, while seasonal variations in costs are also investigated. A primary aim of the leaflet is to trace the effect of variations in turnover on the different items of cost, the statistical basis being, in respect of five packing stations, for the two years ended March 31, 1931, and in respect of three of these five stations for a third year ended March 31, 1932. The evidence tends to show that increased turnover reduces total unit costs, the average for all five stations in 1930-31 compared with 1929-30 revealing 31 per cent. increase in turnover and 5.8 per cent. decrease in total unit costs.

It is not possible to calculate exactly the additional costs consequent upon operation under the National Mark, but five-sixths of the costs of National Mark stations are in respect of functions that any egg dealer has to perform. Only candling and grading can be regarded as an addition to normal practice, and, even here, it is only the less efficient of non-National Mark packers who do not grade to some extent. As to the benefit of the National Mark to producers, the average net price, for *all* grades and qualities, paid to producers (excluding any patronage bonus paid to members by the co-operative Stations) by three of the stations was, in both 1929-30 and 1930-31, equal to or higher than the average of first-quality ordinary eggs at town and country markets, while on the average of all five stations the price paid was in both these years 2½d. per 120 above the average of first and second quality ordinary eggs.

National Mark Malt Products.—In order to secure a wider use of the National Mark on malt products, authorized packers are now permitted to reproduce the National Mark design on their own private brand labels for pharmaceutical malt extract. Up to date, 5 packers have taken advantage of the concession. Authorized packers are now also permitted to apply the National Mark to plain cartons used for dispensing malt extract under the National Health Insurance scheme.

Marketing Demonstrations.—The following programme of marketing demonstrations has been arranged for the autumn:—

* Ministry of Agriculture and Fisheries, Marketing Leaflet, No. 52.

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Wisbech Commercial Fruit Show (Oct. 11-12)	Apples, pears, celery, cauliflower, brussels sprouts
Dairy Show, London (Oct. 17-20)	General National Mark Exhibit; Cheshire cheese, celery, brussels sprouts
Weald of Kent Fruit Show, Marden (Oct. 19-20)	Apples, pears, tomatoes
Holland Potato Show, Spalding (Oct. 26)	Cauliflower, celery
Imperial Fruit Show, Bristol (Oct. 27—Nov. 4)	Fruit, celery, brussels sprouts
Ash and District Commercial Fruit Show, Sandwich (Oct. 31— Nov. 2)	Apples, pears, cauliflower, let- tuce, brussels sprouts
North Kent Horticultural Show, Dartford (Nov. 7-8)	Cauliflower, lettuce, brussels sprouts
Gloucester Root, Fruit and Grain Show (Nov. 9)	Apples, pears, brussels sprouts, cauliflower
Birmingham Cattle and Poultry Show (Nov. 25-30)	Grading of meat; National Mark poultry
Smithfield Fatstock Show (Dec. 4-8)	Do.

The photograph reproduced opposite shows the demonstration of the National Mark Celery Scheme as staged at a recent Show. Although the production of celery in this country has increased during the past few years, there is no doubt that the demand can be stimulated considerably by attention to grading and packing. Details of the scheme, which came into operation on September 6, were given on p. 560 of the September issue of this JOURNAL.

Publicity for National Mark Products : National Mark Shopping Weeks.—A National Mark Shopping "Week" will be held in Cardiff from October 4 to 14, the period of the South Wales Grocers' and Allied Trades' Exhibition, at which the Ministry will stage a display of National Mark products and provide an egg-grading demonstration.

Lectures and Addresses on Marketing.—Arrangements are well advanced for the coming winter season. These include:—

- (1) Lectures on the National Mark to Women's Institutes, Townswomen's Guilds and other bodies, formerly conducted through the agency of the Empire Marketing Board, but after October 1, 1933, to be arranged directly by the Ministry.
- (2) Lectures on the National Mark from the consumer's aspect to branches of the Women's Co-operative Guild in Lancashire, the Midlands, southern and south-eastern England.
- (3) Addresses on the selling value of the National Mark to members of Grocers' Associations.
- (4) Lectures, both on the National Mark movement generally and on the marketing of particular commodities, in connexion with the Extension Lecture programme of local agricultural education authorities.

Applications for lectures should be made to the Ministry of

U.S. DEPARTMENT OF JUSTICE
FEDERAL BUREAU OF INVESTIGATION

CELERY

CELERY

JOIN THE
NATIONAL MA
SCHEME

THE WASHING OF CELERY
AT THE POINT OF PRODUCTION
IS STRONGLY RECOMMENDED

CHINESE
UNIVERSITY

OR FULL PARTICULARS SEE LEAFLET

THE
JOURNAL
OF
THE
ROYAL
ANTHROPOLOGICAL
INSTITUTE

AUTHORIZED PACKERS MAY
SUBMIT OTHER TYPES OF
NON-RETURNABLE OR
RETURNABLE CONTAINERS
FOR APPROVAL DURING
THE FIRST TWO SEASONS

SPECIMEN HEADS
SELECTED (UNWASHED)

PACING CREATE
GRADE -
SUBJECTS /WATCH

Demonstration of the National Mark Celery Scheme as staged at a recent show.

MARKETING NOTES

Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Union of South Africa : Export Bounties on Live Stock and Meat.—According to a Government Notice issued on June 17, 1933, the Minister of Agriculture for the Union of South Africa has made a regulation under the Export Subsidies Act, 1933, providing for higher rates of subsidy on certain classes of meat.

Under the new regulations, the subsidy on frozen beef in quarters exported overseas will vary from 35 per cent. on the f.a.s.* value of 19s. or more per 100 lb., down to 20 per cent. on the f.a.s. value of 16s. 4d. to 16s. 5d. per 100 lb. Frozen beef in quarters exported elsewhere than overseas is now eligible for subsidy at the rate of 20 per cent. on the f.o.r. value of 16s. 4d. per 100 lb., and for values below 16s. 4d. per 100 lb. at a rate to be determined by the Minister.

The subsidy on chilled beef, live slaughter cattle and frozen mutton and lamb exported overseas remains the same as under the old regulations, i.e., from 28 per cent. on the f.a.s. value of 35s. 6d. or more per 100 lb., down to 8·7 per cent. on the f.a.s. value of 28s. to 28s. 5d. per 100 lb.

The subsidy on other meat exported overseas is also unchanged, except in the case of boneless beef exported overseas, the subsidy on which is increased.

Southern Rhodesia Beef Export Bounty Act, 1933.—An Act has recently been passed by the Legislature of Southern Rhodesia for the purpose of subsidizing the export of beef and cattle during the present depressed state of the overseas meat market. It provides for the payment, during the period from May 1 to December 31, 1933, of a bounty not exceeding $\frac{1}{2}$ d. per lb. dead weight on chilled or frozen beef or cattle on the hoof exported overseas. An additional bounty, not exceeding $\frac{1}{4}$ d. per lb. dead weight will be payable on chilled beef derived from stall-fed cattle and exported overseas, or on such cattle exported overseas on the hoof, during the period September 1 to December 31, 1933. On boned and extract beef exported overseas, the bounty may not exceed $\frac{1}{4}$ d. per lb. The Governor is empowered to prescribe the amount of any bounty, the methods of payment and other regulations required to give effect to the purpose and intention of the Act.

* Free alongside.

MARKETING NOTES

United States: Export Grades and Regulations for Apples and Pears.—Under an Act of Congress approved June 10, 1933, shipments of apples and pears from the United States must normally be accompanied by a Certificate of Inspection showing that the fruit conforms to certain minimum requirements as to quality prescribed by the Secretary of Agriculture. The main purpose of the Act is to promote the foreign trade of the United States in apples and pears, and to protect the reputation of American products abroad.

As shipments of apples and pears were due to begin shortly after the passing of the Act, regulations—based on the minimum standards already in force under the Federal scheme of standardization—were promulgated as a provisional measure. Under these regulations, the minimum quality requirement for apples is that of the United States "Utility" or the United States "Utility Early" grade, the latter differing from the former only in omitting any condition as to maturity. The minimum quality requirement for pears is that of the United States "No. 2" grade. Thus, generally speaking, the fruit, while requiring to be mature (except in the case of the "Early" grade for apples above-mentioned and in the case of shipments to a trans-Pacific port) must not be over-ripe; and though slight deformity is permissible, there must be no decay or damage of any serious kind. In addition, apples—but not pears—must be carefully hand-picked. The tolerances laid down for the established grades have also been adopted for the purpose of these regulations, except that the export fruit must be entirely free from apple maggots, and not more than 2 per cent. by count in any lot may have apple maggot injury or be infested with San José scale.

Each package for shipment must be clearly and conspicuously marked with the name and address of the grower or packer, the variety, the grade name and the numerical count or minimum size. The packing must be such that the fruit in the shown face must be reasonably representative in size, colour and quality of the contents of the package as a whole.

While these regulations, which were specified as applying to shipments made before September 1, were, on that date, superseded by a permanent code, the minimum quality requirements indicated above, as well as the requirements as to packing and marking, have been retained in the new code.

OCTOBER ON THE FARM

H. G. ROBINSON, M.Sc.,

Midland Agricultural College, Sutton Bonington.

At the time of writing these notes, the country lies parched and badly in need of rain. The persistence of long periods of fine weather is so rare a feature of the English climate that we have to go back to the summers of 1929 and 1921 for similar examples in recent years. Incidentally, when drought occurs very few are prepared for the consequences. Very little growth of grass has taken place during the last three months. Where farms have been heavily stocked, the available grazing has been bared off, and the burnt appearance of the pastures offers little hope of natural winter keep for outlying stock. At such times as these real comfort is derived from the availability of autumn and winter forage and root crops. It is probably too late to expect much growth in pastures, even if favourable conditions exist, though it is surprising how quickly fields can regain their normal colour after rain. In 1929, there was a certain amount of grass growth in October after the drought ended.

The extended spell of fair weather has not altogether been without beneficial results. Fallows have rarely been more easily or more cheaply managed, while the labour bill generally over hay-time and corn harvest has been kept at a lower figure than for many years. Against this, the arable crops that still occupy the ground have suffered, and as far as eastern England is concerned, yields of roots and potatoes will be below normal. On most farms there are abundant stocks of good hay, the possession of which greatly eases winter feeding problems under existing conditions. Unfortunately, inroads have been made on these reserves of winter food earlier than usual.

Apart from the sowings of winter oats and wheat, the chief work during October usually concerns the raising of main crop potatoes, and of mangolds and sugar-beet. After a hot summer it would not be surprising if fairly severe winter conditions were experienced, in which event proper

is well worth while. The weather is such an uncertain factor in farming that it is always sound policy to anticipate the worst. For the same reason, whenever satisfactory conditions obtain it is always profitable to go all out to make the most of them. This applies to more than harvest.

At the moment the prospects for live stock are somewhat mixed. The low prices for fat cattle have caused graziers considerable losses, but the outlook for improved prices in the winter is fairly bright. The rapid decline in the feeding value of grass this autumn will necessitate earlier and more liberal feeding of supplementary foods. A common mistake is to put off too long. Where sheep are maintained on fluke-infested land, attention to treatment should be regularly paid throughout the winter. The dry summer will probably prove a boon in the control of this trouble, but the pest is very widely distributed at the moment, even in districts which were once thought to be fairly free. Monthly dosing with carbon tetrachloride or other approved preparations is to be recommended as a precaution against loss in affected areas.

Wheat Seedings.—Wheat is now the most important cereal in cultivation, and one may anticipate that the present acreage will be maintained. The year 1933 has been a particularly good one for this crop, while the forward character of the work on most farms this autumn suggests that very favourable conditions will exist for autumn seedings. It is important to stress the value of a firm seed bed for this crop, and cultivations should be designed to effect this. Apart from this essential it is an advantage to have a deeply tilled soil, though it is frequently assumed that too much cultivation may injure the prospects of the crop by producing too fine a tilth at seeding time. Some revision of opinion is probably necessary on this point. The time-honoured assumption is that wheat must have a good protective clod after sowing, with the object of protecting the young plants in the early stages of growth against cold winds. This is a sound inference, though during the last three years the writer, by taking wheat after potatoes, on land that is free working, has not had the advantage of the winter clod that is deemed desirable. Further, in order to secure firmness in the seed bed it has been necessary to use the Cambridge roller. Notwithstanding the fine tilth after seeding the crops of wheat have been most satisfactory. It would, however, be unsafe to apply generally the treatment

attention paid to the protection of potato and root crops that has succeeded on a particular farm, without making a preliminary trial. On soils that tend to run together, too fine a tilth might prove a drawback, though it is interesting to note that at Rothamsted a dusty tilth at sowing has given no injurious results during the last three years.

As mentioned in the notes for last month, in the eastern midlands October and early November sowings usually give the best results. Later sowings are possible, especially if the season is favourable, but there is always the risk of failure if a particularly severe spell sets in after a late sowing. Early sowings are specially desirable on strong land, by reason of the deterioration in the soil conditions that normally occurs with the approach of winter.

The seed rates employed in practice vary considerably. It is laid down in text-book teaching that the quantity sown should increase as the season advances and according to the decline in fertility. Research work at Cambridge has indicated that the productiveness of wheat crops is greatly dependent upon a regular distribution of plants over the field. Counts of the number of plants per foot of drill row have shown great variations, and it is obvious that more attention could be profitably paid to obtaining greater regularity and a heavier population of plants. It may be argued that most farms employ a seed rate that practice has shown to be best for local conditions. There is still room for some experimental work on the optimum seed rate. The writer prefers to use liberal seedings generally, and for wheat 3 bushels per acre are normally sown. A great deal depends on the intensity of the factors responsible for the loss of plants after sowing. Thus, where rooks are particularly troublesome it may be necessary to make allowance for these, but weather conditions and the state of the ground may account for differences in results as between one year and another.

The importance of dressing seed corn with an appropriate preparation to prevent bunt is now generally recognized. The introduction of powder dressings, like copper carbonate and certain proprietary mercury compounds, has been the means of popularizing the sowing of treated grain, from the fact that the treatment is simply applied. Copper sulphate and formalin are still used, however, but there is a danger of a lower germination with both of these.

The Dairy Herd.—Where it is customary to house dairy cows in winter, it will be necessary to be prepared to bring the cows in at nights. There is little point, even in a normal year, of delaying too long, and particularly when newly-calved cows are concerned. The extension of ranching systems of dairy farming, under which cows are kept outside, winter and summer alike, has suggested that winter housing is a luxury that might well be less general. This form of dairy farming, however, is not well adapted to intensive conditions. It is necessary to have well-drained pastures with a sound bottom, a fair proportion of winter grazing available, and a certain amount of natural shelter. These conditions do not obtain universally, hence the desirability of housing. If suitable conditions are available for running milking cows out of doors the whole of the winter, there are some advantages that often make the practice worth while. This is principally reflected in the building up and maintenance of a healthier herd. It is very easy to pamper stock, whereas exposure to natural conditions favours the law of the survival of the fittest.

With cattle that are housed in winter, an attempt should be made to safeguard health by the avoidance of "coddling." Warmth acquired at the expense of fresh air is not helpful in this direction. Unfortunately the ventilation in many cowsheds is abused. The maintenance of a cooler interior as a result of allowing an adequate inflow of air will invariably be attended by improved health of the cattle in winter. The design of cowsheds is not always perfect in the details of ventilation. The ideal system ensures the changing and circulation of air without apparent draughts. The latter when present are apt to be dangerous.

Cleanliness in the production of milk is now legally necessary. The difficulties are sometimes increased in winter. The chief troubles arise from the tendency of cows to soil themselves with their dung and litter when lying down. This tendency is most marked where the length of the standings is such that the cows deposit their dung on the place which is occupied by their hindquarters when they lie down. To obviate this difficulty the length of standings has been shortened in many instances with quite successful results. There is a danger, however, that standings may be so short as to be distinctly uncomfortable for the cows, and this feature is observable in many modern cowsheds. It seems desirable to study the comfort of the cow at rest,

even if it necessitates the use of a little more water and "elbow grease" in cleaning down cattle before milking.

The flooring of cow standings has received much intensive study. The ideal from the sanitary viewpoint is not always ideal for comfort. On the other hand, that which is comfortable is not always conducive to cleanliness. In most instances concrete is utilized as the soundest material for flooring, but it is essential to have it underlaid with insulating material such as broken brick, if one desires to avoid too cold a floor. Litter of some kind tends to soften the hardness, and it may well be borne in mind that, as an economy, chopped straw goes farther than long straw.

Incidentally, the use of chopped straw makes it possible to remove the dung and soiled litter from the cowshed to the field for direct application without being troubled with long straw. The writer has followed this course for several years, the dung being taken from the cowshed and applied to arable land throughout the winter with entirely satisfactory results. The use of a low-loading cart equipped with pneumatic tyres has proved an asset for this purpose.

The most recent development in cowshed flooring consists of the use of rubber blocks or mats for the standings. It is too early to pass judgment on these except that the large mats that cover the whole standing are likely to be more satisfactory than rubber blocks. With rubber there is warmth and softness, so that bedding materials are unnecessary. On some farms the cost of litter is an important item and a flooring that dispenses with litter is likely to prove an asset. Where there is an abundance of straw, the method of housing cows in a large, covered or partly-covered yard is in many respects ideal for comfort. It is perhaps more difficult under such conditions to control the amount of roughage fed to cattle but any excess is trodden into valuable manure.

The extent to which cows are allowed access to grass land during the daytime throughout the winter varies considerably. There are instances in which cows are never turned out of the sheds throughout the winter, and particularly since water bowls have been extensively utilized. In general, however, exercise is good for cows. Common sense should enable one not to permit undue exposure on very cold days. The danger of chills is less marked where the cowshed ventilation is under proper control. It is usual in the first half of winter to give forage, such as kale, on

PRICES OF ARTIFICIAL MANURES

the pastures. It was at one time the writer's practice to extend this to roots right through the winter. The main objection is the difficulty of rationing individual cows under these conditions, while the pastures on the College Farm are very apt to tread up badly in wet weather. Roots are therefore now pulped and given in the sheds.

PRICES OF ARTIFICIAL MANURES

Description	Average price per ton during week ended September 20				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 8d	£ 8d	£ 8d	£ 8d	s. d.
" " Granulated (N. 16%) ..	7 8d	7 8d	7 8d	7 8d	9 7
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 15d	6 15d	6 15d	6 15d	6 7
Calcium cyanamide (N. 20.6%) ..	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 6	3 0	2 17	3 0g	4 3
Potash salts (Pot. 30%) ..	5 2	5 1	4 17	4 17g	3 3
" " (Pot. 20%) ..	3 15	3 9	3 6	3 10g	3 6
Muriate of potash (Pot. 50%) ..	9 4	9 1	8 15	8 17g	3 6
Sulphate " " (Pot. 48%) ..	10 7	10 7	10 0	10 19	4 2
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
" " (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	3 2	..	3 4	2 16k	3 6
" " (S.P.A. 13½%) ..	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	..	6 15	6 7f	6 7	..
Steamed bone-flour (N. ½%, P.A. 27½-29½%) ..	..	5 12	5 2f	5 7	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, and for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON MANURING

J. HUNTER SMITH, B.Sc., C. E. HUDSON, N.D.H., and
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It is a good thing, in any sphere of activity, to recall occasionally the elementary first principles concerned and to review in their light the particular plan or routine that has been evolved in the course of, perhaps, many years of practice. Such a review may lead to distinct improvements in practice—it may even lead to breaking out from a rut that is no longer tending in the right direction.

It may be said that, as the result of a great deal of laboratory and field experimentation, the fundamental principles of crop nutrition were thoroughly established three-quarters of a century ago. It is true that another twenty-five years had to elapse before the anomalous behaviour of leguminous crops received a satisfactory explanation, but that was only a special case and not really an exception. The fundamental knowledge acquired was that the matter that constitutes any plant or crop is derived mainly from water and atmospheric carbon dioxide, but in addition small but essential quantities of numerous other simple substances are taken in by the plant via the root. If a plant is grown under laboratory conditions, e.g., in sand or water instead of soil, all of these numerous chemical substances must be supplied, but under field or garden conditions they are usually present in sufficient quantity for some sort of growth to take place—but not necessarily enough for a satisfactory crop to be produced. As far as the energy stored up in the plant is concerned the fundamental discovery was that this is derived from sunlight.

From the point of view of the practical man the first important advance from the statement of the simple elementary facts is the provision of an answer to the question "Can I improve my crops by the addition of any of the substances known to be essential for plant growth?" It was the outstanding triumph of the early Rothamsted experiments to provide some clear, irrefutable answers to

this question. The most important answer was that, under practical conditions, the addition of nitrogen, phosphorus, and potassium compounds to the soil frequently lead to marked improvement in crop production, but that the addition of the other substances does not produce a similarly marked increase. From this work resulted the huge world-wide fertilizer industry of to-day, capable of turning out annually millions of tons of these compounds.

The next question of the practical man is more precise: "In what amounts, in what form, and when, should these substances be applied to a particular crop on my holding?" To this question it is quite impossible, for reasons which will be discussed in later articles, to give a definite and unconditional answer, yet every grower has to answer it in practice. The agricultural adviser also has to make a precise recommendation which, although arrived at after reviewing all the evidence available, can seldom be more than an honest commonsense suggestion and not the "ideal" answer.

An illuminating comparison may be drawn between the feeding of crops and the feeding of animals. When stock are being fed indoors, e.g., pigs being fattened or cows on winter rations, it is possible to control the whole of the food supply and to adjust it, utilizing the latest scientific knowledge, to the performance of the animals concerned. When, however, the cows are out to grass or the pigs on free range, at once much of this precision is lost, so that the rationing under these circumstances, though it can be and is controlled, must necessarily be less exact.

The grower of crops is always in the position of the feeder of stock on free range—he does not know the crop ration already available in his soil, and at present there is no simple method by which the grower or the adviser can obtain this knowledge. For this and other reasons manuring cannot yet be a scientifically accurate operation: it is one of the aims of the research worker to make it less of a gamble, but in the meantime it is well to recognize frankly that this big gap in our knowledge does exist.

There is another important aspect of the subject that cannot be too strongly emphasized: manuring is only one of the factors concerned in crop production. Everyone knows this, yet there is a temptation to forget it, or at least to hope, like the sick patient, that there is some magic prescription that will put everything right. Rainfall,

NOTES ON MANURING

drainage, soil reaction, soil type, cultivations, seed rate, plant population, pests, diseases—all these have a substantial influence on crop yields and are, jointly, more important than food supply in their effect on the crop. Superimposed on these technical factors is the dominant economic consideration, the question of profit and loss. “Will it pay to use manures at all, and if so how much, what, and when?”

Use of Artificial Fertilizers in Britain.—Comparisons have frequently been made between the use of “artificial” in Great Britain and Denmark, Holland or Germany—generally with the object of showing the great possibility of expansion in their use here. It is difficult to make such comparisons fair: one thing alone renders them of little use and that is the immense importance of grass in Great Britain as compared with other parts of Europe. What is of greater value is to investigate the use of artificial manures within this country and discover what lessons can be learnt.

The economic surveys that have been carried out in recent years have provided valuable information on the extent and kind of the farmers’ expenditure on manures. Report No. 18 of the Farm Economics Branch of the Cambridge School of Agriculture gave an account of an economic survey of Hertfordshire Agriculture in 1930 based on a random sample of 303 farms scattered over the whole county. On these farms the expenditure on all manures averaged only 5s. 6d. per acre of crops and grass: of this one-tenth went on purchased dung, leaving 4s. 11d. per acre for “artificial” and lime: the latter accounted for the trifling sum of 1½d. per acre. Further examination of the figures showed that approximately one-quarter of the farms used no artificial manures, one-third spent nothing or less than 2s. per acre, one-third spent between 4s. and 12s. while a very few farms used over 12s. per acre. This is a remarkable state of affairs to exist in the county where the Rothamsted experiments have been running for about a century!

The 59d. per acre were distributed as follows: proprietary mixtures, 18d.; nitrogenous fertilizers, 18d.; phosphatic, 14d.; potash, 3½d.; soot, 4d.; lime, 1½d. From the prices paid it is possible to calculate that the expenditure permitted of the addition to each acre of not more than 4½ lb.

NOTES ON MANURING

nitrogen, $7\frac{1}{2}$ lb. phosphoric acid, 4 lb. potash, 5 lb. lime. The report also shows that over the whole sample dung was available at the rate of just over 2 loads per acre of farmed land. Taking the load as 15 cwt. and assuming 11 lb. nitrogen, 5 lb. of phosphoric acid, and 13 lb. of potash per ton, the two loads would supply $16\frac{1}{2}$, $7\frac{1}{2}$, and $19\frac{1}{2}$ lb. respectively of the three plant nutrients. These figures, both for artificials and for dung, are probably not far from the average for the whole of Great Britain—and illustrate very clearly the overwhelming importance attached to farmyard manure as a source of plant food, as compared with inorganic fertilizers.

Since in this survey the percentage of arable land was 58 the figures given above for expenditure per acre of crops and grass may, if desired, be converted into per acre of arable land by multiplying by the factor 1.7: if this is done it should be remembered that much of the phosphatic fertilizers is applied to grass land, and not to arable.

In 1931 and 1932 the Cambridge economists extended their survey to cover nine districts in the Eastern Counties and included 983 farms in the former year and 1,052 in the latter. (Reports No. 19 and 21). The average expenditure on fertilizers proved to be even less than in Hertfordshire, in spite of the fact that the area surveyed is the chief corn-growing district in Britain. A brief summary of the figures is:—

<i>Size Group of Farms. Acres.</i>					<i>Expenditure per acre of farmed land.</i>	
					1931. s. d.	1932. s. d.
20 to 50	..	..	..	..	4 2	3 9
50 to 100	..	..	..	..	3 9	3 7
100 to 150	..	..	..	..	3 10	3 6
150 to 300	..	..	..	..	3 10	4 3
Over 300	..	..	..	..	4 2	3 9

The average expenditure per farm was £28 in 1931 and £27 in 1932, figures showing very close agreement. The district with the highest outlay was the South Hertfordshire Gravel with 5s. 10d. per acre in 1931 and 5s. 8d. in 1932; the lowest in 1931 was the Breckland around Thetford, with 2s. 3d., and in 1932 the West Cambridge and Huntingdon Clays with 2s. 5d. All these figures vary but little with the size of the farm. Of the expenditure, 39 per cent. in 1931 and 47 per cent. in 1932 was on proprietary manures.

As a contrast with these very low figures from the Eastern Counties, results based on 210 farms in Cheshire in 1930

NOTES ON MANURING

may be quoted from "A Survey of Farming in Mid-Cheshire," by S. Barratt:—

	<i>Small Grass Farms.</i>	<i>Small Arable Farms.</i>	<i>Large Grass Farms.</i>	<i>Large Arable Farms.</i>
Expenditure on Manures and Lime per acre of farmed land ..	8s. 6d.	9s. 4d.	7s. 10d.	10s. 0d.

The district is described as "an area known to be well farmed, heavily stocked and containing a high proportion of arable land."

In Scotland surveys covering the whole of the farms in a particular area do not appear to have been carried out, but the following figures kindly provided by the late Dr. King of the Department of Agriculture for Scotland, are stated to be fairly representative of the type of farming they portray. The expenditure on fertilizers in 1930-31 per acre of farmed land was:—

65 cattle feeding farms (North-Eastern Counties) ..	5s. 8d.
31 arable farms (Eastern Counties)	23s. 0d.
32 dairy farms (South-Western Counties)	8s. 2d.

Here the range of variation is very wide.

The purpose in quoting these sets of figures is not to make comparisons between districts, since to do so might be entirely misleading: results from random samples over a wide area may be very different from those based on farms of a specific type or on farms selected for other purposes. The object is rather to set out some illuminating evidence regarding the extent to which manuring is practised by the farmer since this expresses in concrete form what he really thinks about the matter. It is clear that while most farmers do not consider it necessary to spend more than a few shillings per acre on manures, yet a few differ emphatically and regularly spend several times more than the average.

Market Gardening and Glasshouse Crops.—In striking contrast with the meagre amounts of fertilizers used by farmers in recent years are the heavy dressings that form part of the normal practice of the market gardener and glasshouse grower. A typical annual dressing per acre used on market garden ground is:—

40, 60, or even 80 tons of farmyard manure
6 to 10 cwt. of artificial manures made up of—
4 parts finely-ground hoof and horn
2 " bone phosphate
1½ " sulphate of potash

NOTES ON MANURING

For some crops this is supplemented by top dressings of meat meal at 4 to 6 cwt. per acre, or, as alternatives, with sulphate of ammonia or soot, the latter at the rate of a ton per acre. It is quite unnecessary to work out the amounts of nutrients in these dressings to see that for every pound of plant food that the average farmer adds to his soil the market gardener adds at least a score.

It is impossible to produce evidence that such high dressings as these are justified, but it can be confidently asserted that the level of production reached under glass or in good market gardens would be impossible without the high fertility imparted to soil by the frequent addition of large quantities of organic matter, nor could proper control of the crop be secured without the use of considerable amounts of rapidly-acting fertilizers. Further, it has to be remembered that many market-garden crops are of such high value that economy in manuring is of minor or even trivial importance.

Summary.—In this article various simple but important points bearing on the practice of manuring have been mentioned: the serious gap in our knowledge of the plant foods available in the soil; the low level of manuring practised by farmers in recent years; the relatively great importance attached to dung as compared with inorganic fertilizers; the large proportion of what is spent that goes on proprietary mixtures; the comparatively large amounts of manures used by the market gardener; the importance of factors other than manuring in the successful growing of crops. In subsequent notes it is intended to bear these points in mind as the subject of manuring is developed, and whenever definite suggestions are made.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
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Autumn Feeding of Dairy Cows.—In recent years it has been fashionable to assert that autumn grass, particularly when rank and luscious, has a depressing effect upon milk yield. On the other hand, it is accepted, in spite of some suggestion to the contrary, that fresh young grass in spring and early summer has a stimulating or flushing influence on milk production. An explanation offered is that the amino acids present in young growing grass have, in themselves a stimulating effect. Pfeiffer found that asparagine, an amide in young grass, increased the yield independently of nutritive value. Bryner Jones and Henderson noted that brewers' grains and malt extract, two foods rich in amino acids, increased milk yield, while Frugerling and Hanson also attributed to certain foods a beneficial effect over and above their purely nutritive value.

In many districts grass is now very scarce, as a result of the drought, and we hear on all sides that there has been a very marked falling off in the yield of milch cows. Dairy farmers are finding it difficult and expensive to feed their herds, and under ordinary commercial conditions their cows are yielding much less milk at this time, than in seasons when autumn grass has been markedly abundant.

Farmers who have had lucerne or other green food to give to their cows have found it a specially valuable supplement to the burnt-up pastures. In this JOURNAL, November, 1932, the writer drew attention to the value of maize as a green fodder crop, and on certain farms in this country, maize has proved specially valuable this season, by providing green succulent material when such food has been badly needed. Maize has been grown successfully on light land on this farm for the past four years, and yields of over 40 tons per acre have been obtained, while on a heavy land farm in the county, a satisfactory yield has been secured this year. There appears to be no reason why, on farms with some arable land, maize should not be grown more widely. Ordinarily, seed of the American White Horse-tooth of Giant Caragua variety, is drilled about the end of May, at the rate of 2 bushels per acre, in rows 24 in. apart. The land is kept clean by hoeing from time to time, and the crop can begin to come into use about mid-August. It is

NOTES ON FEEDING

possible to get about a month's supply of fodder, but it is true that towards the end of the month the maize may become rather woody and less succulent. To overcome this difficulty, the land may be drilled in portions, at intervals of, say, a fortnight, in order to secure a succession of green succulent stuff at different stages. Cattle prefer the leaf to the stem, and when the stem becomes fibrous they are inclined to leave it uneaten, unless they are very hungry.

The principal consideration in growing maize is that the plant is very susceptible to frost, and in consequence it is necessary to postpone seeding until danger of frost is over, and to drill the seeds somewhat deeper than cereals. It is also necessary to finish the crop before autumn frosts occur.

On finishing the maize about mid-September, our scheme is to give the cows A.I.V. grass silage, made from grass cut when it is abundant in the early season. Such grass should have, at the time of cutting, a composition suitable for milk production. Grass is often so plentiful in May and June that much of it is wasted, and it seems sound practice to ration the amount of grass fed to cows when it is specially luxuriant, and to save some of it in the form of silage, for use in the autumn, if required, or in winter. When A.I.V. grass silage is used up in autumn, the silo can be filled again with sugar-beet tops, for feeding later in the winter.

There are two simple methods of making grass silage that might be practised. One is to cut the grass when green and succulent, and build it into a stack. This has been done successfully by Hosier, who attributes much of the success of his methods to having the grass sufficiently damp at the time of making the stack. If there is not enough moisture present in the grass when stacking, he sprays it with water in layers on the stack, in order to secure the correct degree of wetness. There is always some waste round the outside with stack silage, but the quality of the silage in the inner portion of the stack made by Hosier in the way indicated, was observed to be of particularly good quality.

The other simple method of conserving grass as silage is by the A.I.V. process. For this purpose a small wooden circular silo in two sections has been used on this farm. Last winter, sugar-beet-top silage was made satisfactorily, and in the summer the silo was filled with grass, which was sprayed with water and A.I.V. solution, in the way generally recommended and described in *The Scottish Journal of Agricul-*

NOTES ON FEEDING

ture, July, 1932. As the grass was drier than the sugar-beet tops, considerably more water was used in spraying in order to ensure its being sufficiently damp. This type of small wooden silo is inexpensive, and as it prevents most of the waste round the outside of the silage, it should be useful for the smaller dairy farms. One of these silos should be sufficient to provide upwards of 10 cwt. of silage per cow for a herd of 20 cows. When used at the rate of 28-35 lb. per day this could be reckoned to provide a supplement to autumn grass for a period of about one month, to come in between maize and kale.

Of the purchased feeding stuffs, dried sugar-beet pulp, soaked and given wet, is a useful substitute for grass or green fodder: 5 lb. of the dried pulp will be equivalent, when soaked, to about 35 lb. of roots or green stuff.

In Britain, it is only dried beet pulp that is on offer in any quantity from the factories, as the latter are so few that the transport of wet pulp is not a practical proposition, except to farms reasonably near the factories. In Denmark, and some other countries, there are local depots, where the preliminary stages of sugar extraction are carried out, and the pulp returned in the wet state to the farms where the beet has been grown. The sugar-beet tops and the wet pulp are clamped in alternate layers, and in this way the beet by-products can be preserved in satisfactory form for feeding to cows in the winter, and even in the following late summer, when grass becomes scarce. Large quantities are sometimes given to cows, as much as 70 lb. per head per day to cows tethered on grass.

Wet grains, when available within reasonable distance, have been found particularly useful this summer in maintaining the milk yield under drought conditions. Of the concentrated foods, bran, given damp, has perhaps the best reputation for use during dry and warm weather when keep is dried up and scarce. According to the accepted tables* wheat bran contains, per lb., 0.43 starch equivalent and 0.10 protein equivalent. On this basis it would need about 6 lb. of bran to supply the standard amount of nutriment required per gallon of milk, namely 2.5 lb. S.E. and 0.6 lb. P.E. Certain of those who are concerned with investigations into the value of bran as a feeding stuff, claim that the figures quoted from the tables mentioned, hardly do sufficient justice to the feeding value of bran,

* Bulletin No. 42. *The Feeding of Dairy Cows.*

NOTES ON FEEDING

and that actually some quantity, considerably less than 6 lb., would be sufficient to supply the necessary nutriment for the production of a gallon of milk. Actual practice would appear to confirm the view that bran has a higher feeding value than the ordinary analysis indicates, but, be that as it may, the special value of damp bran in stimulating milk production and in maintaining healthy condition in cows on dry pastures in hot weather, is recognized by many keen observers and efficient managers of dairy cattle. Both in the dry season of 1921, and again this year, dairy cows have been kept in good form and their yields have been well maintained, where bran has been given at the rate of 6 lb. per day and upwards. Bran is correctly balanced for milk production, but apart from this it possesses some special property which has been noted, though not fully explained by investigators.

The Ration for Bacon Pigs.—The ration of feeding stuffs on which the feeding cost of bacon pigs is based, under the Pigs Marketing Scheme, is as follows:—

Barley Meal	..	..	65 per cent.
English Middlings	..	..	25 „ „
Protein and Mineral Content	..	..	10 „ „

As far as the producer is concerned, his profit from bacon pig production will be considerably affected by the cost of his ration. It should not be supposed that 10 per cent. of fish meal is essential in the mixture. Indeed, many curers object strongly to the use of much fish meal, particularly in the later stages of feeding. At present prices, the substitution of soya bean meal for fish meal, will make a difference of about 16s. per ton in the cost of the mixture of feeding stuffs. Where soya bean meal is used, however, it is advisable to include minerals at the rate of at least 2 lb. per cwt. of the mixture. A suitable mineral supplement is 1½ lb. ground chalk and ½ lb. iodized salt, costing about 1d. per lb. With wheat and maize both relatively cheaper than barley meal, the ration might be varied as follows, and economies thereby effected:—

A.	{	Barley Meal	..	..	..	50 per cent.
	{	Wheat Meal	..	..	..	25 „ „
	{	Middlings	..	..	..	15 „ „
	{	Soya Bean Meal	..	..	..	10 „ „
B.	{	Barley Meal	..	..	..	40 per cent.
	{	Maize Meal	..	..	..	25 „ „
	{	Middlings	..	..	..	25 „ „
	{	Soya Bean Meal	..	..	..	10 „ „

together with minerals as recommended above.

NOTES ON FEEDING

It is recognized that soya bean meal, being a vegetable product, is not a complete substitute for fish meal, but it has given satisfactory results, particularly in the case of bacon pigs over 16 weeks old. Before this age, the 10 per cent. protein content might well consist of one-half whale flesh meal and one-half soya bean meal.

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent</i>	<i>Protein equivalent</i>	<i>Per ton</i>
	<i>Per cent.</i>	<i>Per cent.</i>	<i>£ s.</i>
Barley (imported)	71	6.2	5 8
Maize	78	7.6	4 6
Decorticated ground-nut cake	73	41.3	7 5
" cotton cake ..	68	34.7	7 0

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.29 shillings, and per unit protein equivalent, 1.63 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1932, issue of the Ministry's JOURNAL, p. 781.)

FARM VALUES.

CROP	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9.6	5 9
Oats	60	7.6	4 10
Barley	71	6.2	5 2
Potatoes	18	0.8	1 5
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 10
Beans	66	19.7	5 17
Good meadow hay	37	4.6	2 15
Good oat straw	20	0.9	1 7
Good clover hay	38	7.0	3 0
Vetch and oat silage	13	1.6	0 19
Barley straw	23	0.7	1 11
Wheat straw	13	0.1	0 17
Bean straw	23	1.7	1 12

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway W.C.2, price 6d. net.

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
Wheat, British	£ 4 15	£ 0 10	£ 4 5	72	s. d. 1 2	d. 0.62	% 9.6
Barley, British Feeding	5 10	0 8	5 2	71	1 5	0.76	6.2
" Canadian No. 4 Western ..	5 8	0 8	5 0	71	1 5	0.76	6.2
" Argentine	5 5	0 8	4 17	71	1 4	0.71	6.2
" Danubian	5 10†	0 8	5 2	71	1 5	0.76	6.2
Oats, English white	5 7	0 9	4 18	60	1 8	0.89	7.6
" " black and grey	5 7	0 9	4 18	60	1 8	0.89	7.6
" Scotch white	6 0	0 9	5 11	60	1 10	0.98	7.6
" Canadian No. 2 Western ..	6 5	0 9	5 16	60	1 11	1.03	7.6
" " No. 3	5 15	0 9	5 6	60	1 9	0.94	7.6
" " mixed feed	4 18	0 9	4 9	60	1 6	0.80	7.6
" Argentine	5 5	0 9	4 16	60	1 7	0.85	7.6
" German	5 13§	0 9	4 4	60	1 9	0.94	7.6
" Russian	5 8†	0 9	4 19	60	1 8	0.89	7.6
Maize, American	4 10†	0 8	4 2	78	1 1	0.58	7.6
" Argentine	4 3	0 8	3 15	78	1 0	0.54	7.6
" Gal. Fox.	4 2†	0 8	3 14	78	0 11	0.49	7.6
" Russian	3 15§	0 8	3 7	78	0 10	0.45	7.6
" South African	4 18†	0 8	4 10	78	1 2	0.62	7.6
Beans, English Winter	5 8§	1 0	4 8	66	1 4	0.71	19.7
Peas, Japanese	20 0†	0 17	19 3	69	5 7	2.99	18.1
Dari	6 0†	0 10	5 10	74	1 6	0.80	7.2
Milling offals—Bran, British ..	4 17	1 0	3 17	43	1 9	0.94	9.9
" " broad	5 5	1 0	4 5	43	2 0	1.07	10
Middlings, fine imported ..	5 5	0 14	4 11	69	1 4	0.71	12.1
" coarse British	5 12	0 14	4 18	56	1 9	0.94	10.7
Pollards, imported	4 12	0 19	3 13	62	1 2	0.62	11
Meal, barley	6 7	0 8	5 19	71	1 8	0.89	6.2
" " grade II	5 12	0 8	5 4	71	1 6	0.80	6.2
" maize	5 2	0 8	4 14	78	1 2	0.62	7.6
" " South African	5 0§	0 8	4 12	78	1 2	0.62	7.6
" " germ	5 5	0 13	4 12	79	1 2	0.62	8.5
" locust bean	6 12	0 7	6 5	71	1 9	0.94	3.6
" bean	7 10	1 0	6 10	66	2 0	1.07	19.7
" fish	15 0	2 16	12 4	59	4 2	2.23	53
Maize, cooked flaked	5 12	0 8	5 4	84	1 3	0.67	9.2
" gluten feed	5 17	0 15	5 2	76	1 4	0.71	19.2
Linseed cake, English, 12% oil ..	8 17	1 4	7 13	74	2 1	1.12	24.6
" " " 9% "	8 12	1 4	7 8	74	2 0	1.07	24.6
" " " 8% "	8 7	1 4	7 3	74	1 11	1.03	24.6
Soya-bean cake, 5½% oil	7 12§	1 13	5 19	69	1 9	0.94	36.9
Cottonseed cake—English, EGYPTIAN seed, 4½% oil ..	5 0	1 4	3 16	42	1 10	0.98	17.3
" " " Egyptian, 4½% oil ..	4 10	1 4	3 6	42	1 7	0.85	17.3
" " " decorticated 8% " ..	7 0†	1 14	5 6	68	1 7	0.85	34.7
" " " meal, decorticated 7-8% " ..	7 0†	1 14	5 6	68	1 7	0.85	34.7
Coconut cake, 6% oil	6 0†	1 1	4 19	77	1 3	0.67	16.4
Ground-nut cake, 6-7% oil	6 11	1 2	5 9	57	1 11	1.03	27.3
" " " decor. 6-7% oil ..	7 5	1 12	5 13	73	1 7	0.85	41.3
Palm-kernel cake, 4½-5½% oil ..	5 17†	0 14	5 3	73	1 5	0.76	16.9
" " " meal, 4½% oil ..	5 17†	0 14	5 3	73	1 5	0.76	16.9
" " " meal, 1-2% oil ..	5 10	0 15	4 15	71	1 4	0.71	16.5
Feeding treacle	5 0	0 9	4 11	51	1 9	0.94	2.7
Brewers' grains, dried ale	4 12	0 15	3 17	48	1 7	0.85	12.5
" " " porter	4 5	0 15	3 10	48	1 6	0.80	12.5

* At Bristol. † At Liverpool. § At Hull.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of August, 1933, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 24s. per ton as shown above, the food value per unit of starch equivalent is 1.20d. Dividing this figure by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.20d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculation a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N. 6s. 7d.; P.O., 3s. 8d.; K.O., 3s. 8d.

MISCELLANEOUS NOTES

Scholarships for the Sons and Daughters of Agricultural Workmen and Others

THE selection of candidates in connexion with this year's offer of scholarships under the scheme of scholarships for the sons and daughters of agricultural workmen and others has now been completed. The total number of applications submitted was 512, and 135 scholarships have been awarded. These awards have been allocated as follows:—

Six Senior Scholarships tenable at university departments of agriculture or agricultural colleges for degree or diploma courses in an agricultural subject; 10 Extended Junior Scholarships, not exceeding one year in duration, for advanced or specialized courses of instruction at farm institutes or agricultural colleges; and 119 Junior Scholarships tenable at farm institutes or similar institutions for courses not exceeding one year in agriculture, horticulture, dairying or poultry husbandry, or in a combination of two of these subjects. The successful candidates include 98 men and 37 women applicants.

During the 12 years (1922-1933) the scheme has been in operation, assistance has been granted to some 1,300 individuals involving the award of 1,494 scholarships. The distribution of these awards among the various classes of beneficiary is as follows:—

	Eleven years,		Total.
	1922-1932.	1933.	
Sons or Daughters of Agricultural Workmen ..	357	40	397
„ „ „ Working Farm Bailiffs ..	106	10	116
„ „ „ Smallholders ..	338	36	374
„ „ „ Other Rural Workers ..	215	21	236
Candidates who qualified on their own account as <i>bona-fide</i> workers in agriculture ..	343	28	371
Total ..	<u>1,359</u>	<u>135</u>	<u>1,494</u>

Stud Goat Scheme

THIS scheme, having for its object the improvement of the productive quality of milch goats kept by smallholders, cottagers and others of similar position, is again in opera-

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tion. For the current breeding season, which lasts till February 28 next, 89 stud goats have been registered and are standing at various centres throughout the country, including 11 in Wales, and their services are available for goats belonging to persons in the above-mentioned categories at a nominal fee, in no instance exceeding 4s. Conditions of service and other information may be obtained from the County Agricultural Organizers at their respective County Education Offices, or from the Secretary of the British Goat Society, which is responsible for the administration of the Scheme, at Roydon Road, Diss, Norfolk.

The report on the operation of the scheme during its ninth season shows that steady progress has been achieved. Thirty-four counties in England and Wales recorded entries, the Isle of Wight being represented for the first time. Thirteen new centres were opened. The goats registered numbered 98, and 1,683 services were allowed for premium.

The Agricultural Index Number

THE general index number of agricultural produce for August at 105 was 4 points above the July figure and was the same as that recorded a year ago. The rise of 4 points on the month was due chiefly to the higher prices for barley, milk and eggs, although these were offset to some extent by the decreases in those for wheat, fat sheep and potatoes.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

<i>Month.</i>		1928.	1929.	1930.	1931.	1932.	1933.
January		145	145	148	130	122	107
February		143	144	144	126	117	106
March		145	143	139	123	113	102
April		151	146	137	123	117	105
May		154	144	134	122	115	102
June		153	140	131	123	111	100
July		145	141	134	121	106	101
August		144	152	135	121	105	105
September		144	152	142	120	104	—
October		139	142	129	113	100	—
November		141	144	129	112	101	—
December		140	143	126	117	103	—

Grain.—Wheat and oats at 5s. 9d. and 5s. 6d. per cwt. respectively were cheaper than in July, the former by as much as 10d. and the latter by 3d. per cwt. but, while the index for wheat depreciated by 9 points to 72, that for oats

MISCELLANEOUS NOTES

rose by 4 points to 79. A sharp increase of 2s. 11d. to 9s. 6d. per cwt. occurred in the average for barley, the index for which was 37 points higher than in July at 125. In August, 1932, wheat averaged 6s. 5d., barley 6s. 10d. and oats 7s. 5d. per cwt., the relative indices being 80, 90 and 106.

Live Stock.—Prices for fat cattle continued to fall during the month under review and the average of 33s. 10d. per live cwt. was about 1s. lower on the month. This decline, however, was proportionately less than that which occurred in the base period and the index rose 2 points to precisely the pre-war level. Sheep also were again cheaper, a drop of $\frac{1}{4}$ d. to $7\frac{1}{2}$ d. per lb. being recorded, and the index was 4 points lower on the month at 103. Bacon pigs at 9s. 9d. and porkers at 10s. 2d. per score lbs., however, were dearer by 5d. and 7d. respectively, the index for the former advancing one point to 95 and for the latter 3 points to 96. Dairy cows were little altered in price at 4 per cent. above the base period but store cattle, at 2 per cent. less than pre-war, averaged rather more. Store pigs also were dearer and the index rose 7 points to 115, but store sheep again sold at lower prices and were 4 points lower at 83.

Dairy and Poultry Produce.—A further increase in the contract prices for milk occurred during August and the index for milk was 8 points higher at 150. A year ago a rise of 5 points to 148 was recorded. Butter was about $\frac{3}{4}$ d. per lb. dearer during the period under review, but this increase was relatively smaller than that in the base period and the index fell 2 points to 92. An advance of 2s. 9d. to 12s. 11d. per 120 in the average for eggs, however, was proportionately much greater than in 1911-13 and the index was 14 points higher at 117. Prices for chickens and ducks continued to fall and the combined index for poultry was reduced 6 points.

Other Commodities.—Quotations for early potatoes showed the customary fall during August and the index was 4 points lower at 91 as compared with a fall of 28 points to 106 a year ago. Both clover and meadow hay were a little dearer on the month, the combined index being 3 points higher at 71. Wool has remained very firm in price and the index was unaltered at 72. As regards fruit, apples have sold at about 16 per cent. above the base period but plums have realized slightly less than in 1911-13.

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Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	Aug.	Aug.	May	June	July	Aug.
Wheat	79	80	71	80	81	72
Barley	100	90	85	94	88	125
Oats	92	106	76	77	75	79
Fat cattle	129	118	97	95	98	100
„ sheep	138	90	120	114	107	103
Bacon pigs	95	86	107	97	94	95
Pork	105	87	107	96	93	96
Dairy cows	125	110	101	104	105	104
Store cattle	131	113	99	94	96	98
„ sheep	140	81	84	83	87	83
„ pigs	132	86	112	106	108	115
Eggs	117	115	92	102	103	117
Poultry	131	117	132	132	126	120
Milk	155	148	138	138	142	150
Butter	110	100	85	91	94	92
Cheese	123	125	115	121	125	115
Potatoes	145	106	97	80	95	91
Hay	88	68	68	69	68	71
Wool	69	61	62	63	72	72

Advisory Leaflets

SINCE the date of the list published in the April, 1933, issue of this JOURNAL (p. 90), the undermentioned Advisory Leaflets have been issued by the Ministry:—

- No. 159. Bark Beetles and Shot Borers.
- No. 160. Swift Moths.
- No. 161. Rabbits for Fur and Flesh.
- No. 162. Angora Rabbit Wool Production.
- No. 163. The Onion Fly.
- No. 164. The Raspberry Beetle.
- No. 165. The Wood Pigeon.
- No. 166. Selection of Dairy Cattle and Milk Recording.
- No. 167. Hand and Machine Milking.
- No. 168. Bacillary White Diarrhoea of Chicks.
- No. 169. The House-Sparrow.
- No. 170. Pea and Bean Thrips.
- No. 171. The Cultivation of Flax for Fibre.
- No. 172. Earcockles of Wheat.
- No. 173. Bacon Curing on the Farm.
- No. 174. The Gout Fly.
- No. 175. The Stem Eelworm (a) Horticultural Crops.
- No. 176. Currant and Gooseberry Aphides.
- No. 177. The Wheat Bulb Fly.
- No. 178. The Stem Eelworm (b) Agricultural Crops.
- No. 179. Daddy Long Legs or Crane Flies.
- No. 180. The Cultivation of Raspberries.
- No. 181. Home Storage of Apples and Pears.

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- No. 182. Spurrey.
No. 183. Narcissus Flies.
No. 184. Faults and Difficulties in Buttermaking.
No. 185. Table Poultry Production.

Copies of any of the above-mentioned leaflets can be purchased from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or at the Sale Offices of that Department at Edinburgh, Manchester, Cardiff and Belfast, price 1*d.* each net (1½*d.* post free), or 9*d.* net per doz. (10*d.* post free).

Single copies of not more than 20 leaflets will, however, be supplied, free of charge, only on application to the Ministry. Further copies beyond this limit must be purchased from H.M. Stationery Office, as above.

A selected list of the Ministry's publications, including leaflets, on agriculture and horticulture can be obtained free and post free on application to the Ministry.

Coloured Wall Diagrams

ACCURATE diagnosis is the very foundation of successful curative treatment, both of human ills and of the diseases and pests of plants. Rural dwellers and workers should be able to identify pests such as Winter Moth and Apple Blossom Weevil, and diseases such as Silver Leaf and Apple and Pear Scab. From the horticultural standpoint, knowledge of this kind is infinitely more valuable and more generally useful than that concerning merely the names and families of wild flowers, or any other similar accumulation of information that too often passes for education in rural matters.

Fortunately, the recognition of symptoms is frequently simple and certain, so much so that, once the observer is familiar with the distinctive features of the effect of the disease or pest, it is possible to identify some complaints from visible evidence alone. A few years ago the Ministry published a series of posters, or wall diagrams,* expressly designed to facilitate the recognition of the pests and diseases mentioned above, and although several hundred sets have been sold, it is thought that their value and usefulness are

* No. 1. *Apple Blossom Weevil*. No. 2. *Winter Moths*. No. 3. *Apple and Pear Scab*. No. 4. *Silver Leaf*. Prices: Unmounted, 3*s.* each (3*s.* 2*d.* post free), or 9*s.* per set of four (9*s.* 5*d.* post free). Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or on personal application at the Ministry.

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not yet fully appreciated, nor their existence sufficiently widely known.

These posters are clearly printed in four colours, and are self explanatory. They are 30 by 20 in. in size, and thus are very suitable for exhibition in class-rooms, rural institutes, lecture-halls, museums, the buildings of large fruit plantations, etc.

Cider Fruit Crop Estimate, 1933

INSPECTORS of the Ministry have furnished estimates of the probable yield of cider apples, in England and Wales; these indicate that the yield will be somewhat heavier than during the two years 1932 and 1931.

The following table shows the index figure for each of the principal districts, together with the corresponding figure for 1932. The scale on which the index figures are based is as follows:—25 or under = very bad; 26-35 = bad; 36-45 = poor; 46-55 = fair; 56-65 = very fair; 66-75 = good; over 75 = very good:—

	1933.	1932.
Devon	40	23
Dorset	50	35
Gloucester, West	55	15
Hereford	50	20
Monmouth	13	10
Somerset	48	28
Worcester, West	35	15
Worcester (Worcester and Droitwich areas)	26	15

Rothamsted Winter Lectures

SIR JOHN RUSSELL, the Director of the Rothamsted Experimental Station, has again arranged that Mr. H. V. Garner, the Guide-Demonstrator, and other members of the staff, shall be available during the winter, to deliver lectures on the experiments at the Station, to Chambers of Agriculture and Horticulture, Farmers' Clubs, Farm Workers' Associations, Agricultural Societies, etc. No fee will be charged for the lecturers' services, but organizations will be expected to defray travelling and hotel expenses, and to make all necessary arrangements for holding the lectures. Titles of lectures and names of lecturers are subjoined. From these a selection may be made, and the Station will endeavour to suit the convenience of the organization con-

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cerned. Only one subject can be dealt with in a single lecture. Requests for lectures, giving as much notice as possible, should be addressed to *The Secretary, Rothamsted Experimental Station, Harpenden, Herts.*

LECTURES BY MR. H. V. GARNER, M.A., B.Sc. (*Guide Demonstrator*).

- (1) Modern Practice in the Use of Manures.
- (2) Experiments on the Cultivation and Manuring of Wheat.
- (3) Recent Experiments with Potatoes and Sugar Beet.
- (4) Recent Results with Forage and Fodder Crops.
- (5) The Use of Cheap Nitrogen.
- (6) Some Results of the Rothamsted Experiments on Commercial Farms.
- (7) Some Practical Aspects of the Liming Question.

OTHER LECTURES.

- (1) *Soil Micro-Organisms* (*Bacteria, Protozoa, etc.*)
 Inoculation for Lucerne. Dr. H. G. Thornton, B.A.
 After-effects of a Crop of Lucerne. Dr. Hugh Nicol, M.Sc.
 Life in the Soil.
 Biological Aspects of Partial Sterilization. } Mr. D. W. Cutler, M.A.
- (2) *Agricultural Botany.*
 Weeds of Farm Land and Methods of Control. }
 Eradication of Farm Weeds by Spraying with Chemicals and Manures. } Dr. Winifred E. Brenchley, F.L.S.
- (3) *Agricultural Chemistry.*
 Liming and Chalking. }
 Recent Developments in the Production and Use of Fertilizers. } Dr. E. M. Crowther, F.I.C.
 Basic Slags and other Phosphatic Fertilizers. } Dr. H. L. Richardson, M.Sc.
- (4) *Soil Physics.*
 Recent Developments in Soil Cultivation. Dr. B. A. Keen, F.Inst.P.
 Soil Acidity: Its Cause and Control. Dr. R. K. Schofield, M.A.
- (5) *Entomology.*
 The Work of the Economic Entomologist. Dr. C. B. Williams, M.A.
 Cultural Methods of Insect Control. Dr. H. F. Barnes, M.A.
 Apicultural Problems. Mr. D. M. T. Morland, M.A.
- (6) *Plant Pathology.*
 Virus Diseases of Plants. Dr. J. Henderson Smith, M.B.
 Plant Diseases: Their Causes and Control. Dr. J. Caldwell, B.Sc.
 Miss M. D. Glynne, M.Sc.

Certified Stocks of Strawberry Plants and Black Currant Bushes.—The Ministry announces the issue of registers of the names and addresses of growers of strawberry plants and black currant bushes whose stocks have been examined during the past season and certified as true to type, reasonably free from rogues, and, in the case of black currant bushes, apparently free from reversion. Growers desirous of planting reliable stocks will be well advised to consult

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these registers before placing orders for new stocks. The registers may be obtained free and post free from the offices of the Ministry, 10, Whitehall Place, London, S.W.1.

Foot-and-Mouth Disease.—Since last month's (September) issue of this JOURNAL went to press, the Ministry has confirmed the existence of five further cases of foot-and-mouth disease in Great Britain. Four of these occurred in Hampshire and one in Norfolk; and the usual restrictions were imposed on the movement of cattle, sheep, pigs, goats and deer within areas surrounding the various infected premises.

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on September 25, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Cheshire.—An Order continuing the operation of the existing minimum and overtime rates of wages from November 1, 1933 (i.e., the day following that on which the existing rates are due to expire), until October 31, 1934. The minimum rate for male workers of 21 years of age and over is 31s. per week of 54 hours, with overtime at 8d. per hour. For female workers of 18 years of age and over the minimum rate is 6d. per hour for all time worked, provided that when engaged for milking such workers shall receive not less than 6d. per "meal" (i.e., each occasion on which the worker visits her place of employment for the purpose of milking).

Gloucestershire.—An Order continuing (with a modification in respect of the week in which Boxing Day falls) the operation of the existing minimum and overtime rates of wages from October 8, 1933 (i.e., the day following that on which the existing rates are due to expire), until April 7, 1934. The minimum rates for male workers of 21 years of age and over are as follows:—

Head Carters: 34s. 2½d. per week of 52½ hours in the week in which Christmas Day falls and 60 hours in any other week in winter; and 32s. 9½d. per week of 51 hours in the week in which Good Friday falls and 58 hours in any other week in summer.

Head Shepherds and Head Stockmen: 34s. 2½d. per week of 52½ hours in the weeks in which Christmas Day and Good Friday fall and 60 hours in any other week.

Under Carters: 32s. 9½d. per week of 50½ hours in the week in which Christmas Day falls and 57 hours in any other week in winter; and 30s. 10½d. per week of 48 hours in the week in which Good Friday falls and 54 hours in any other week in summer.

Under Shepherds and Under Stockmen: 32s. 9½d. per week of 50½ hours in the weeks in which Christmas Day and Good Friday fall and 57 hours in any other week.

Other Male Workers: 28s. 6d. per week of 39½ hours in the week in which Christmas Day falls and 48 hours in any other week in winter, 41 hours in the week in which Good Friday falls and 50 hours in any other week in summer.

The overtime rates for all male workers of 21 years of age and over are 8½d. per hour on weekdays and 10½d. per hour on Sundays, Christmas Day and Good Friday.

The minimum rate for female workers is 4½d. per hour, irrespective of age.

Lincolnshire (Holland).—An Order continuing the operation of the existing minimum and overtime rates of wages from October 29, 1933 (i.e., the day following that on which the existing rates are

MISCELLANEOUS NOTES

due to expire), until October 27, 1934. The minimum rate for male workers of 21 years of age and over is 32s. 6d. per week of 39½ hours in the week in which Christmas Day falls, 48 hours in any other week in winter, 41 hours in the week in which Good Friday falls, and 50 hours in any other week in summer. For horsemen, cattlemen and shepherds, an inclusive weekly sum is fixed to cover all time worked in excess of the number of hours mentioned above, except employment which is to be treated as overtime employment. The overtime rate for male workers of 21 years of age and over is 10½d. per hour on Saturdays (or on any other day agreed as the weekly short day), 1s. 1½d. per hour on Sundays and Christmas Day, 8d. per hour on Good Friday and 9d. per hour for all other overtime employment. The minimum rate for female workers of 15 years of age and over is 6d. per hour for all time worked.

Pembroke and Cardigan.—An Order continuing the operation of the existing minimum and overtime rates of wages from October 1, 1933 (i.e., the day following that on which the existing rates expire), until September 30, 1934. The minimum rate for male workers of 21 years of age and over is 30s. per week of 52 hours in winter and 54 hours in summer, with overtime on weekdays and on Sundays at 8d. per hour. For female workers of 18 years of age and over the minimum rate is 5d. per hour for an 8-hour day throughout the year, with overtime on weekdays at 6d. per hour and on Sundays at 6½d. per hour for the first three hours and 7½d. per hour for subsequent hours.

Enforcement of Minimum Rates of Wages.—During the month ending September 14, legal proceedings were taken against three employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed			Costs allowed			Arrears of wages ordered			No. of workers involved	
Lancashire	Widnes	...	£	s.	d.	£	s.	d.	£	s.	d.	2
North-berland	Wooler	...	1	0	0	0	5	0	5	5	0	1
Yorks, W. R.	Pontefract		*			—			—			2
		£	1	10	0	5	8	0	11	5	0	5

* Case dismissed.

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APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Cheshire.—Miss M. Clayborn, B.Sc., has been appointed Student Demonstrator in Horticulture, *vice* Miss M. Huntbach.

Derbyshire.—Mr. A. E. Cope, N.D.P., F.B.S.A., has been appointed Instructor in Poultry-keeping, *vice* Mr. G. W. Brindley.

Hampshire.—Miss D. M. Evans, B.Sc., has been appointed Instructress in Dairying at the County Farm Institute, Sparsholt. Mr. G. E. Burkitt, N.D.P., has been appointed Assistant County Poultry Instructor.

Mr. W. Wells, N.D.P., has been appointed Assistant Instructor in Poultry-keeping at the County Farm Institute, Sparsholt.

Northumberland.—Mr. O. J. Pattison, M.Sc.(Agric.), N.D.A., has been appointed Assistant Organizer of Agricultural Education, *vice* Mr. W. Craib, B.Sc.

Miss E. Cuthbertson, N.D.D., C.D.D., C.D.P., has been appointed Instructress in Dairying and Poultry-keeping, *vice* Miss A. Bretherton, N.D.D.

Staffordshire.—Miss G. M. Woods has been appointed Instructress in Domestic Service, *vice* Miss M. Turner.

WALES

Denbighshire.—Mr. A. W. Jones has been appointed temporary Poultry Instructor, *vice* Mr. A. E. Cope.

Merionethshire.—Mr. R. P. Thomas, N.D.H., has been appointed Instructor in Horticulture, *vice* Mr. C. H. Jones.

Monmouthshire.—Miss K. Cragg, N.D.D., has been appointed Assistant Instructor in Dairying, *vice* Miss A. Hall.

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Report of Committee on the Sheep Farming Industry in Scotland. Pp. 60. (Glasgow: Scottish National Development Council, 39, Elmbank Crescent, Price 6d.)

Last year the Scottish National Development Council appointed a number of expert technical committees to investigate the present position and tendencies of industry in Scotland. The first of these to be constituted was the Committee on Agriculture, which in its turn appointed seven sub-committees to deal with various branches of the industry. The Report of the Sub-Committee on Sheep Farming, recently issued as No. 6 in the Council's "Economic Series," contains a detailed survey of Scottish mutton and lamb production, marketing and distribution. Attention is drawn to the increase in the low-ground production of sheep, and its adverse effects on hill stocks, employment of labour, raising of store cattle and cultivation. Other matters investigated include imports, breeding, management, prevention and cure of disease, improvement of grazings, lime, drainage, ensilage, transport, deer increases, dogs and sheep-worrying, sheep stealing, forestry and afforestation schemes. The careful manner in which the Sub-Committee has conducted its investigations is evident in this Report, which will be of interest to sheep farmers and distributors on both sides of the Border.

Four Addresses on the Improvement of Grassland. By R. G. Stapledon, C.B.E., M.A. Pp. 50. (Aberystwyth: Welsh Plant Breeding Station. 1933. Price 1s.)

Lectures are often of transitory value, and many that are reprinted might well have been left in a suitable oblivion after they had been delivered. It would, however, be impossible to offer such a criticism

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of the four lectures reprinted in this little book. So much has been written about grass land that new publications on the subject are naturally open to a suspicion of repeating what has already been said, but there is certainly no foundation for such a feeling here.

At the end of the first lecture on "Points of view relative to the study of grass land," Professor Stapledon himself advised his hearers that nothing is more important than thinking enthusiastically, with awe and with wonder (the stuff of which enthusiasm is made), and it is clear that he is able to offer this advice because that is how he thinks himself. No farmer who has the welfare of his grass land at heart should fail to read these extremely stimulating and thoughtful productions. The first was delivered at Harper Adams Agricultural College; the second, on "Land Improvement," to the Shropshire Chamber of Agriculture; the third, on "Climate and the Improvement of Hill Land," to the Annual Conference of the Geographical Association; and the fourth, on "White Clover," to the Cambridge University Agricultural Society. In spite of the diversity of the audiences addressed, the whole forms a summing up of the problems that still remain to be investigated (and these are many) as well as the present position of knowledge in the improvement of the various classes of sub-normal grazing lands.

The first lecture sets out many of the things that we still need to know. The second is full of recipes, something like Mrs. Beeton's Cookery Book, as the lecturer himself points out. The third, addressed to a non-agricultural organization, could provide the layman with the beginnings of an interest in the development of pasture land, as well as a description of the advantages that have accrued to the grass-land farmer as a result of the inventions and scientific discoveries of the past two decades. The fourth is a paean of praise of White Clover, and is extremely instructive in the methods that should be adopted in order to increase the proportion of this plant in pastures differently situated ecologically.

The Apple. By Sir A. Daniel Hall, K.C.B., LL.D., Sc.D., F.R.S., and M. B. Crane. Pp. 235. (London: Martin Hopkinson Ltd. 1933. Price 10s. 6d.)

The first part of this book comprises chapters on the structure of the apple, its cells and the normal and abnormal behaviour of cell nuclei on division. Much of the matter is highly scientific, yet it is so clearly put that any grower can grasp the points and learn how to mix different varieties of apples in orchards to secure that successful fertilization of the blossoms that is the necessary preliminary to a good crop.

The second part of the book contains practical advice on soils, planting and management, and the growing of clean crops of apples. The authors emphasize that when you let apples grow as "God wills" the devil has full play, and in consequence they stress care and control of the trees at all stages. They are convinced that if these modern methods of production are adopted, really good dessert apples could be grown in England and it would be unnecessary to spend such large sums in importing supplies.

The book gives an admirable account of the subject and should be read by all who are interested in growing apples for commerce.

Countrywomen in Council. By J. E. Courtney, O.B.E. Pp. vii + 195. (Oxford University Press. 1933. Price 3s. 6d.)

This little book is packed with useful information, vividly and tersely presented. The outstanding merit, however, is the admirable perspective in which the countrywomen's movement generally is placed. Its present brilliance of development is faithfully depicted against the darker background of the conditions that helped to call it into being and the undefined atmosphere of those new fields of endeavour on which it now seems likely to enter.

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The establishment in our own land of that combination of countrywomen known as the National Federation of Women's Institutes is sympathetically recorded. There is much of historical interest in the sketch of English village life and of those struggles of the agricultural worker for economic and political betterment that were a prelude to the women's movement. The work and influence of the Land Army is admirably portrayed; as is, also, the story of the introduction, from Canada, of the idea of Women's Institutes, destined, as it was, to gain support from the peculiar difficulties of war-time. The growth of the organization and the extension of its interests, in peace-time, from material needs to the social and educational sides of village life evidenced that "new consciousness of the value of corporate effort, born of the general emancipation of women and specially of their work in the War."

A later section of the book deals with other agencies for the betterment of rural life with which the Women's Institutes have intimate relations. Community work in music and drama, county library schemes and the activities of Rural Community Councils and Townswomen's Guilds are reviewed with insight and understanding.

An epitome of the history of the Scottish Rural Women's Institutes provides another informative chapter. Notes on parallel developments in other parts of the Empire are interesting and suggestive.

Mrs. Courtney is appreciative not only of the achievements of the countrywomen's movement but of its possibilities. She refers to the efforts now being made, by bodies such as the Liaison Committee of Rural Women's and Homemakers' Organization, to promote international understanding by linking together the countrywomen's organizations of the world. She mentions the immense opportunities that lie open before national organizations of this type, many of which are only now realizing the full extent of the influence they can wield.

The Retailer's Guide to Fruit Marking. By T. D. Matkin. Pp. 46. (London: Retail Fruiterers' and Florists' Association, Ltd. Price 1s.)

Without going into any of the more intricate legal questions involved, this booklet gives a survey of the law of marking that will be useful for ready reference.

It opens with a brief but pointed summary of the position under the Merchandise Marks Act, 1887, in regard to the use of trade descriptions, and then deals in a more comprehensive manner with the Merchandise Marks Act, 1926, under which are made the Orders in Council (known in trade circles as Marking Orders) requiring the marking of particular commodities with an indication of origin when sold or exposed for sale in the United Kingdom. The procedure to be followed, as laid down in the provisions of the Act, in the making of Marking Orders is also outlined.

Since the handbook is primarily intended for the use of retail fruiterers, two complete chapters are, very appropriately, devoted to the Marking Orders applicable to apples and tomatoes, and are rounded off with a further chapter dealing with the marking of fruit in general. Some shrewd comments are made on the psychology of marking, and many helpful hints are given on the important point of making the most effective use of marking, both as regards compulsory marking and marking that is entirely at the discretion of the trader. An additional feature is an index of place names which shows whether the places mentioned are Empire or foreign territory.

The Flexibility of Farming.—*Progress in English Farming Systems: VII.* By A. Bridges and E. L. Jones. (Oxford: Clarendon Press. London: Humphrey Milford. 1933. Price 1s. 6d.)

The idea that the farmer is a person who lives up to the statement that what was good enough for his grandfather is good enough for

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him has already received rude shocks as a result of the previous publications in this Series. No. VII is no less a blow to the townsman's concept of the countryman. It records the methods adopted by yet another farmer to overcome the difficulties with which he has been confronted in a period of falling prices and changing demand. Although in the beginning of his occupancy of his present farms he followed a system usual in the district, he was prepared to make any necessary changes in that system, and even to expend the capital necessary to construct a new farm road to enable him to economise transport; later, he introduced a completely novel method of dealing with the processes of mixed farming. The new feature is a strict departmentalization of the various classes of live stock upon particular areas of the farm, the cultivation on that area of crops specially for the particular class of live stock, and careful concentration upon cash crops whenever possible during the rotation. So far as can be judged from the figures here presented, the system seems likely to be successful, and it is stimulating and suggestive for other farmers who may be seeking a means of reorganizing their undertakings in such a way as to bring them back once more to a profit-making basis. In addition to the detailed information describing Mr. Abbott's system, hints are given of other systems adopted by his neighbours in their attempts to achieve the same purpose.

The Law of Smallholdings in Scotland. By J. Scott. Pp. ix + 398. (Edinburgh: W. Green & Son, Ltd. 1933. Price 21s.)

This book deals comprehensively with a large and difficult subject. The Landholders Acts are many and complicated, and Mr. Scott's book is, in effect, a plea for a Consolidating Act of Parliament. Legislation originated with the Crofters Act, 1886, by which the Crofters' Commission was set up to deal with all questions relating to the tenure of smallholdings in the seven Crofting Counties. A series of Acts followed, the most important being the Small Landholders (Scotland) Act, 1911, the Land Settlement (Scotland) Act, 1919, and the Small Landholders and Agricultural Holdings (Scotland) Act, 1931. It is some measure of the importance of these Acts that they regulate the conditions of tenure of two-thirds of the whole number of agriculturists in Scotland. The 1911 Act extended the provisions of the Crofters Act to the whole of Scotland; the Board (now Department) of Agriculture for Scotland was established as the administrative office for smallholdings, and a Land Court was constituted to supersede the old Crofters' Commission. The decisions of the Land Court have given rise to a large body of case law, and the judicious selections Mr. Scott has made from these decisions indicate the vast scope and complexity of the work of the Court. It is part of the duties of the Land Court, and by no means the least part, to deal with applications from smallholders to define their status, and much may depend on the decision as to whether the applicant is a Landholder or Statutory Small Tenant. The Act of 1886 legislated for two classes only, the crofter and the cottar, but since then many distinctions have been created as regards categories of tenure, all of which are faithfully recorded and dealt with by the author.

This book is a very thorough exposition of the law as it stands; it is copiously illustrated with references to relevant decisions of the Land Court, and is to be recommended to any student of the Scottish Land Law.

The Empire Journal of Experimental Agriculture, Vol. I, No. 1. Pp. 96. (Oxford: Clarendon Press. 1933. Price 7s. 6d.; Subscription [4 numbers] 20s. post free.)

The first number of this new periodical will be welcomed by all who are interested in agricultural research work. It is, as the Minister of Agriculture states in his introductory note, "a natural and valuable development from the Imperial Agricultural Conference of 1927."

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The results of that Conference have already been of great value to research workers throughout the Empire by virtue of the publications of the Imperial Agricultural Bureaux which do so much to keep workers in remote districts in touch with the general trend of investigation in their special subjects. The new Journal will form a vehicle for the publication of original papers from all parts of the Empire. The present number contains two articles dealing with soil surveys, three with plant subjects, and one upon a disease of sheep, as well as an interesting discussion of grain-growing in Kent in the thirteenth century, and a valuable discussion of the historical development and present position of hay-making machinery.

A Survey of Milk Marketing Schemes and Price Policies. By Ruth L. Cohen, B.A. Pp. 68. (Cambridge: University School of Agriculture. 1933. Price 2s.)

This study is an attempt to appraise the value, to the community as a whole, of price policies used in the marketing of milk by farmers' organizations in America and in England and Wales. The author takes as the ideal price that which would occur under "stable competitive conditions," i.e., when the consumers' price just covers the marginal costs of production and distribution of the supply absorbed at that price, and when the marginal return on the capital and labour engaged in the production and distribution of milk is equal to the marginal return obtainable in other employments.

A number of factors in production conditions prevent the attainment of stability even when competition is free, while the strength attained by distributive organizations in England and in the United States also operates in the direction of restricting the free play of competition. For these reasons, and also because prices must be fixed well in advance, the author claims that a farmers' organization is justified, from the point of view of the community as a whole, provided that it adopts a price policy that in general gives a price level approximating to the "stable competitive price."

The factors to be considered by an organization in attempting to pursue an ideal price policy are discussed in Chapter II. The following chapters analyse critically a number of price plans operated by marketing organizations in the United States, the price agreement operative in England and Wales since 1922, and the plan proposed in the report of the Re-organization Commission for Milk and Milk Products.

To the mathematically minded, the formulæ used by the author in illustration of her subject will no doubt be useful.

Research in Marketing of Farm Products: Scope and Method.

Social Science Research Council: Bulletin No. 7. Edited by J. D. Black. Pp. 221. (New York: Social Science Research Council, 230, Park Avenue. Price \$1.00.)

This Bulletin is one of a series of reports devoted to the study of scope and method in agricultural economic research. It is an omnibus volume prepared under the direction of the Advisory Committee on Social and Economic Research in Agriculture, acting upon instructions from the United States Social Science Research Council. Contributions from no fewer than forty research workers provide a comprehensive study of the economic problems of agricultural marketing, and the whole work has been considered by, and is supplemented with the criticisms of, an able editorial committee under the chairmanship of Professor John D. Black.

After outlining, in general terms, the limits of the field of economic research in the marketing of farm produce, and indicating the direction in which the study of this subject has developed in the United States, the body of the report is given up to accounts, in varying degrees of detail, of the *modus operandi* of sixty-six projected

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investigations. In most of these, attention is directed to the four main aspects of the work, viz., the objective, or objectives, that must be kept in view; the allied work, which has recently been done, or is in course of completion; the sources from which data may be available; and the interpretation of the material obtained.

It is intended that this Bulletin should be of assistance in the determination of a suitable subject for investigation, as well as in the planning of a continuous programme of research. Unfortunately, at least in this country, no institution is equipped to undertake nearly such a comprehensive programme as that contemplated in the report, and the scope of individual investigations is more often determined by the pressing needs of the moment. Nevertheless, it cannot be denied that there are practical possibilities for more co-ordinated planning in research, and this series of publications should provide useful guidance towards the ideal. The extent to which the details of the specified projects will be of assistance to intending investigators must necessarily depend upon the status of the investigator, but the classified references to recent and current work which are thus provided will be appreciated by everyone. The value of this Bulletin will be most apparent to post-graduate research workers who contemplate investigations connected with the marketing of farm produce, and it should be everywhere available as a reference book for such circumstances.

Manufacturing Milk: A Survey of Milk Marketing and Utilization in West Cornwall. By F. J. Prewett. Pp. 34. (Oxford: Clarendon Press. Price 2s. 6d.)

This little survey is the third of a series that Mr. Prewett has published in an attempt to unravel the actual process of marketing and utilization of milk in certain typical dairying districts. The district under review in this survey is a portion of West Cornwall covering some 146,000 acres, in which the farming is predominantly dairy farming and there are few towns to create a strong local demand. The result is, therefore, that only a small proportion of the total output of the milk of this area is disposed of in the liquid milk market; and some 80 per cent. of the production goes into manufacture.

As the author says, it is a widely-held belief that profit on dairy farming can only be made on liquid milk sales, and that milk which goes into manufacture is generally disposed of at a loss. In this area of West Cornwall, however, 80 per cent. of the milk production is manufactured into butter, and he has ascertained that 60 per cent. of the total butter produced is sent out of the district, which leads him to the conclusion that "it is evident that dairy farming devoted to butter-making at world competitive prices can be made to pay." He thinks that the business might be conducted more advantageously to farmers than it is at present, because he finds that butter marketing in the district is quite chaotic. There is no co-operation or, apparently, any desire for united action. A pool projected in the district a few years ago broke down because farmers would not consent to merge the identity of their consignments in the bulk and thus most of the butter is disposed of by individual sale in small lots. Mr. Prewett believes that if it were not for this individualistic attitude, the Cornish butter prices, representing (in June, 1930) rather less than 5d. per gallon of milk, could be appreciably raised, and his view is that it should not be difficult to organize the trade, which is predominantly an "export" trade to other parts of the country.

Another view of Mr. Prewett's survey brings out the fact that the milk from the surveyed area would supply any large British town, with the exception of London, and the existence of a potential supply of this magnitude naturally acts as a brake on high-price policy in other parts. He thinks that sufficient attention has not been given in discussions of milk prices to the existence and effective influence of such intensive manufacturing areas as that in West Cornwall, which is the subject of his survey.

NOTICES OF BOOKS

The Preservative Treatment of Estate and Farm Timber. By R. C. B. Gardner. Pp. 36 and 7 Figs. (London: British Wood Preserving Association, 166, Piccadilly, W.1. 1933. Price 6d.)

In issuing this very complete and informative booklet, the Association has made a really valuable contribution to the available information needed by those responsible for estate and farm management. Previous works on timber preservation published in this country have usually had in view the needs of the large user, and have dealt with such subjects as railway sleepers, or telegraph poles; or, alternatively, have been intended for the safeguard of timber subject to attack by tropical insects.

The present work has a humbler but equally useful aim, and within its limitations is extremely complete and helpful. It defines "naturally durable" timber (such as oak and larch) and points out the advantages that are conferred by preservative treatment when quantities of sapwood are retained, as must be the case when fence posts with their natural butts are used. There is also a rough classification between easily treatable and refractory timbers from the point of view of penetration of preservative. The circular discusses the influence of soils upon the ordinary quality of home-grown timber, both as influencing growth, and when in contact after fixing, and also the possibility of employing numerous species of timber not commonly regarded as serviceable. The conclusion is reached that "vast untapped resources must exist on farms and estates throughout the country which can be drawn upon for fencing material, etc., without having recourse to the more valuable oak and larch."

On the practical side, very full illustrated advice is given as to preparation of timber before treatment, and the various methods of applying preservatives—ranging from brushing-on to pressure-treatment. The available preservatives are fully described and (most important and unusual) a guide is given as to the relative costs of the various types of plant and preservatives mentioned. Every agent or large farmer should possess this useful publication.

Gardening with Herbs for Flavour and Fragrance. By H. Morgenthau Fox. Pp. xviii + 334. Illustrations by L. Mansfield. (London: Macmillan & Co. Ltd. 1933. Price 18s.)

Miss Morgenthau Fox is a pioneer among amateur herb growers in the United States, where until lately aromatic herbs have been held in no special esteem. "Recently there has been a renaissance of interest in herbs for flavour and fragrance," although, as a commercial undertaking, herb growing has met with little success in America. Personal experience, resulting from the diligent collection and cultivation of over one hundred varieties of herbs has enabled Miss Fox to give accurate descriptions and cultural directions, which should be extremely useful to those interested in the herb garden. The last part of the book is devoted to cookery and herbal teas. Several of the numerous recipes quoted had their origin in France and China. The reader cannot fail to be infected with the author's enthusiasm, the final evidence of which is a comprehensive bibliography.

Violet Culture for Pleasure and Profit. By F. E. Dillistone, F.R.H.S. Pp. 62. (London: Ernest Benn Ltd. 1933. Price 2s. 6d.)

That a second edition of this little manual should have become necessary is good evidence of its popularity, and the author has taken the opportunity of adding fresh information. Recent research on violet diseases is mentioned and there is a short chapter on Import Duties. Amateurs, as well as commercial growers, will find the book full of hints on all aspects of violet growing, concisely written but comprehensive in range.

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Culinary Herbs and Condiments. By M. Grieve, F.R.H.S.
(London: Wm. Heinemann [Medical Books] Ltd. 1933. Price 5s.)

Amateurs interested in herbs will find in this volume a mine of information. The main portion is devoted to a description of some "sweet" or savoury herbs, and full details are given for their cultivation in the garden and subsequent treatment in the drying room and kitchen. Further chapters on herb teas and condiments are added, and there is much interesting historical matter. The writer is to be congratulated on contriving to include so much information in so small a compass without sacrificing the general attractiveness of the book.

Rabbits, Sons, & Co.: Secrets of Rearing and Success (*Lapins, Lapereaux et Cie: Secrets d'Elevage et de Succès*). By A. J. Charon. Preface by J. Capus, formerly French Minister of Agriculture. Third ed. Pp. 319 and 94 figs. (Paris: Librairie Agricole de la Maison Rustique, 26, rue Jacob, VIe. Price 15 frs.)

Rabbit-keeping, like all other branches of agriculture, has had its vicissitudes during recent years, and the present position of the industry demands that those engaged in it should be equipped with the latest and most reliable information on the subject. Professor Charon has devoted particular attention to the practical and economic aspects of the industry, indicating labour-saving methods and devices, new systems of feeding for rapid growth, the effect of salt in rations, etc. The last edition of his brochure was exhausted within a year. The present edition adds further details regarding Dr. MacDougall's colony system of rearing, which appears to have been extensively adopted by breeders in France. Matters of interest to rabbit breeders, such as reproduction, rationing, housing, growth, diseases, disinfection, furs, flesh, costs and prices, are dealt with in a practical manner, the text being assisted by a number of well-chosen illustrations.

Annual Report of the Imperial Institute, 1932. By Lt.-Gen. Sir William Furse, K.C.B., D.S.O., Director. Pp. 52. (London: Imperial Institute, South Kensington, S.W.7. Price 2s.)

This Report records steady progress in all branches of the Imperial Institute during the year under review. The nature and variety of the work is indicated by the following examples of subjects that have been investigated: Standardization of Empire Hardwoods; Empire Ropes for the Royal Navy; Empire Sources of Reptile Skins; Technical Trials on Material for Portland Cement for Nigeria and Nyasaland; Stoneware and Bricks in the West Indies and West Africa; and Charcoal Gas for Motors. Inquiries regarding mineralogical matters were received from practically every country in the Empire. At the request of the Imperial Economic Minerals Committee the Department compiled an interim statistical report indicating the possibilities of inter-Imperial trade in raw mineral products, and this was submitted to the Ottawa Conference. The products received for investigation include practically every class of raw material. We note that during the year the attendance at the Exhibition galleries at Kensington has exceeded a million.

The Social Economics of Agriculture By Wilson Gee. Pp. x + 696. (New York: The Macmillan Company. London: Macmillan & Co. Ltd. 1932. Price 18s.)

The author who sets out to write a book under the title of *The Social Economics of Agriculture* provides himself with an ambit within which he may discuss every aspect of life on the land, and Dr. Wilson Gee has not failed to avail himself of his opportunities, so that the advocates of ruralization of society will find here a good supply of ammunition. It is true that the conditions examined are those of the United States of America, but it is necessary in the advocacy of any policy of amelioration of the lot of the farmer that the conditions in any one country should be compared with those of

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other countries. Standards of living are examined from many angles, and the effect of economic considerations, social factors, farmers' organizations and rural institutions are examined in some detail, while the political problems involved are discussed, and the whole is prefaced by a discussion of agriculture as a fundamental of a social system. Naturally the present condition of American agriculture and the relief measures proposed are not neglected.

This volume embodies a large amount of information, and this is not surprising when we learn that the material has been accumulated during many years of teaching in the subject. Thus it forms a manual for other teachers who are similarly employed, and following the American practice each chapter is supplied with a set of questions as well as suggestions for parallel readings. The value of this contribution to the subject cannot fail to be recognized, and it will, no doubt, be extensively used as a book of reference.

West African Agriculture. By O. T. Faulkner and J. R. Mackie. Pp. viii + 168. (Cambridge: University Press. 1933. Price 8s. 6d.)

The authors explain in the preface that this book has been written specially for candidates for Government Service in West Africa in the Administrative and Agricultural Departments, and that it is also hoped that the book may prove useful to missionaries.

Works such as this, that explain the economics and methods of the farming adopted by native tribes in tropical areas, are to-day of great value. We are now, perhaps, within measurable distance of the time when science will enable the maximum advantage to be taken of the weather and soil conditions in tropical areas to increase the supplies of foodstuffs and of industrial crops in which these areas can be made rich. A series of books of the kind at present under notice would provide a conspectus of possibilities of the future of agriculture in the tropics which is at present unobtainable.

Beyond these wide general considerations there is also the more immediate problem of improving the condition of the native in the economic and climatic conditions in which he finds himself. Considerable work in this direction is undertaken by the Agricultural and Administrative Departments on the West Coast, and with the accumulated and increasing agricultural experience of these Departments, the native farmer will benefit even more extensively than he has done so far. The authors not only point out the best methods of approach to the problem of introducing new and improved systems of farming to the native, but describe in detail the crops grown and the methods of dealing with them at present in vogue amongst the native population of the different districts of West Africa.

There is only one unfortunate omission that makes this information difficult of assimilation. The book might have been provided with some kind of a map showing at a glance the geographical relations of the different areas. A verbal description of the position of a particular soil type or type of climate is by no means so illuminating as a sketch map would have been. Apart, however, from this obvious defect the book provides the information for which it was designed. Readers who are interested in the world-wide development of agriculture, as well as the particular public concerned, will do well to study this carefully written and comprehensive little work.

Land Reclamation in Italy (*Das italienische Meliorationswesen*). Heft I. By Dr. W. Busse. *Berichte ü Landw.: Neue Folge*: 74, Sonderheft. Pp. 123. Illus. (Berlin: Paul Parey, 11, Hedemannstrasse, S.W. 11. 1933. Price RM. 13.50.)

The great importance of the Italian land reclamation undertakings has resulted in the visits of a large number of specialists to that country, because the work done is not only important nationally, but embodies experience that cannot fail to be of service to other nationals who are engaged upon similar enterprises. The present volume is a result of such a visit by its author.

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Everybody is aware of the large areas of marsh, and at the other end of the scale, arid land which is characteristic of parts of Italy, and the efforts of the Fascist Government in reclamation and settlement of these areas can only be viewed with the greatest admiration. Every effort is made to secure that the work should be done by private enterprise, and for this purpose the inhabitants of the district are encouraged to undertake it with the help of Government assistance, both technological and financial. If the local inhabitants have become too stagnant in their outlook to accept the proposals made to them, they are expropriated at a reasonable price, and the work is done direct by the Government or by some individual or Corporation financed either from private sources or assisted with national funds. When the work is completed the intention is that the land should pass back into private occupation and should be used by the settlers placed upon it for their own advantage.

Work has been done in areas of both types, both in stagnant marsh, where malaria is rife, and in arid districts. The methods adopted in the different circumstances of various districts are described in detail by Dr. von Busse in Part IV of this work. The present volume contains particulars of twelve undertakings.

Part I of the work, which completes the matter at present published, is introductory and contains a dissertation upon physical conditions in Italy, and a brief history of the measures taken before the Fascist regime, and since that system has been in being. The study will be completed by the issue of two further parts, No. II, Legislation; and No. III, Organization and practical results.

Journal of the Royal Welsh Agricultural Society, 1932. Pp. 220 and 34 Illustrations. (Obtainable from the Secretary, Queen Buildings, Queen Street, Wrexham. Price 5s.)

This publication records the transactions of the Royal Welsh Agricultural Society, as well as the main agricultural activities throughout the Principality and border counties during the past year. In addition to full data concerning the Society, there are articles on the Welsh Plant Breeding Station, Welsh Rural Industries, the Feeding of Pigs, and Permanent and Temporary Pastures, and a useful directory of Welsh officials and societies.

Intensive Apiculture and the Rearing of Queens (*l'Apiculture Intensive et l'Elevage des Reines*). By A. Perert-Maisonneuve. Fourth ed. Pp. 733 and 120 figs. (Paris: Les Presses Universitaires de France, 49, Boulevard St. Michael, Ve. 1933. Price 45 frs.)

The author of this manual is a French magistrate, well-known by several works on law, commercial geography and wireless telegraphy. The present study embodies his personal experience and research during a lifetime of practical bee-keeping, and the fact that his book has been crowned by both the Academy of Sciences and the Academy of Agriculture, and approved by the French Minister of Agriculture, is sufficient indication of the appreciation with which it has been received.

The new edition, which has been augmented by 200 additional pages and some 50 illustrations, deals with every aspect of the subject. A chapter is devoted to the various races of bees, in which, incidentally, the French native bee is defended from some of the charges that have been brought against it. Such practical questions as the rearing and selection of queens, construction of the apiary, manipulation of bees in a movable comb, hiving and treatment of natural swarms and casts, preparation of honey, diseases and pests of bees, are discussed in detail. The price is low for such an informative and compendious work. It may be added that the value of the book is enhanced by the excellent arrangement of its matter, and by its many practical illustrations.

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NOTES FOR THE MONTH

Hay and the Drought

SELDOM can anything have been more welcome in the countryside than the rains towards the end of September. Within a week or two, pastures that seemed dried out had already taken a new lease of life, and soon looked like providing useful keep for at least a couple of months. This promise has been strengthened by subsequent growth. It is recorded that in 1868, when in some districts practically no measurable rain fell throughout the summer, and both hay and roots were failures, fresh autumn growth after rains maintained the cattle out-of-doors till Christmas. Farmers hope that history will, once again, repeat itself.

It is interesting to compare one field with another as regards response to moisture. The more fertile fields revive first and so the farmer is at once given a lead as to which of them are most in need of manurial treatment. Owing to general depression in the live-stock industry and the consequent shortage of ready money, the application of fertilizers to grass land has for the past few years been largely in abeyance. With a hope of better times, it may be anticipated that once again advantage will be taken of cheap fertilizers to encourage growth when it is most wanted, and so to replace the more expensive feeding stuffs.

Most farmers aim to carry over a stack or two of hay from one year to the next, but in years of plenty the hay is not as a rule all of good quality, and there is apt to be considerable wastage both in the stack and in the process of feeding. Consequently the carry-over, often less than expected, may not go very far. This winter, all available hay, new and old, on most farms is likely to be required

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before "green leaves come again." It will have to be carefully rationed, the best being reserved for the animals that will make the best use of it. In this connexion some trials recently reported from America are all in favour of chaffing. Chaffed hay seems to lose nothing in palatability, and from the productive and economic point of view is superior to long hay.

When the "bread" of the farm is in short supply, the alternative of "eating cake" is too simple to be sound, at all events until everything possible has been done to eke out the stock of "bread."

Farmers are not of the class that can afford to take no thought for the morrow. They must plan for a bumper crop of hay in 1934, and aim at quality as well as quantity. Quality or feeding value is dependent on the judicious use of fertilizers and on cutting at the right time. If there should be more grass than can be adequately stocked, plans should be laid for cutting the surplus and conserving it at suitable times throughout the summer. Not every farmer can afford a special drying outfit, but most farmers can contrive ways and means of saving grass in an edible and nutritious condition either by haying or ensilage.

Practical Training of Women for Rural Life: the Monmouthshire Scheme

THE Agricultural Institute at Usk, which was established by private benefaction in 1913 and passed under the control of the County Council in 1923, has been practically reconditioned in the past decade. An important stage in the programme was completed by the opening of new quarters for some 30 women students and staff on October 2, 1933. The arrangements for this erection and for the reconstruction of farm buildings had, fortunately, been concluded before the financial embargo of 1931 took effect.

The limited and inconvenient accommodation for women students at the old farmhouse has been replaced by an up-to-date structure in admirable correspondence, from the architectural standpoint, with the men's hostel. The block of buildings now forms a pleasant whole, and when the grounds have been planted up, and roofs and walls have weathered, it will be in harmony, as institutions for agricultural education surely should be, with the beautiful countryside it serves.

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The interior of the new building is no less satisfactory, decorated throughout, as it is, in plain but artistic fashion and provided with furniture and fittings both in study bedrooms and common rooms, in accordance with modern needs and tastes. Women students taking the courses already open to them at the College in all branches of agriculture will appreciate the increased comfort provided by modern equipment, and will be impressed in their residential quarters by the charm and simplicity of the effects achieved.

A feature of the new accommodation is the inclusion of an instructional kitchen and laundry. This renders possible the opening of a new course, and to that end a special Instructress in Rural Domestic Economy has been added to the staff. The work will necessarily be largely experimental at first, but it is hoped to establish finally a one-year course with an appropriate examination and recognized certificate. There is thus an opportunity of developing in Monmouthshire, on the Farm Institute level, a system of instruction for women in food production and food utilization as successful and comprehensive as those already flourishing in centres in Ireland and Scotland. Pioneer work in this direction has already been done in Wales through the summer course at the Denbighshire Farm Institute, the appointment of a special instructress in Carmarthenshire and, on the Welsh borders, by the special courses at the Shropshire Technical School for Girls at Radbrook, Shrewsbury. There is a peculiar appropriateness therefore in the distinctive lead that Monmouthshire is now giving by promoting a course the scope and character of which marks a great advance in the development of this branch of agricultural education.

The subjoined extract from the provisional syllabus relating to instruction in cookery gives some idea of the help which will be given to students in the art of turning home-grown food to the best account:—

Cookery.—Preservation of fruit and vegetables by bottling, jam and jelly making, canning and pickling. The joints and parts of meat—beef, veal, mutton, lamb, pork, and their economical utilization. Making of brawn, galantine, faggots, potted meat, etc. Dry and wet pickling, bacon curing, sausage making. Drawing, trussing, and cooking of poultry and game. Skinning, trussing and cooking of rabbits and hares. Preservation of eggs and varied methods of cooking. Filleting and cooking of fish. Value of milk, junket making, jelly, milk puddings, soft cheese-making. Making of white, brown and fancy bread; yeast buns and cakes, scones, biscuits, cakes; short

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crust, suet crust, hot-water crust and flaky pastry. Breakfast and supper dishes, portable meals, invalid and convalescent cookery. Beverages and home-made wines, Christmas cookery, simple sweet-making. Food values and the planning of meals.

At the opening of the new hostel, performed by Alderman Evan Thomas, J.P., under the Chairmanship of Councillor Meredith, J.P., supported by other members of the County Council, reference was made by the Divisional Inspector, Mr. W. S. Jones, to the practical sympathy evinced by the Ministry of Agriculture in the schemes of improvement. In this instance the enterprise of the local authority and the Principal, backed by substantial financial contributions from the Ministry, have achieved results that promise to be far-reaching. Monmouthshire has now equipped itself to carry out the many-sided work which County Institutions of agricultural education will be increasingly called upon to fulfil. The County Institute will henceforward serve as a source of inspiration both in the raising of home-grown food and in its effective use. A centre of this kind should, in the future, be invaluable as a rallying point for county teachers of domestic science and others concerned to encourage healthful and economical standards of living, and to promote the revival of agriculture. Gatherings of such interested persons will go far to promote that co-operation between town and country, which as the Mayor of Newport pointed out, at the opening ceremony, is so much to be desired in the interests of producers and consumers. Meantime, as Sir Henry Mather Jackson said on the same occasion, women students at the Institute will be learning how to approach the problems of rural home-management from a new and scientific angle.

Statistical Methods in Agriculture

THE Council of the Royal Statistical Society has decided to form a section for the purpose of promoting the application of methods of statistical analysis to problems in agriculture and industry. It is felt that the time has now arrived for the formal provision of facilities for the discussion of various points raised by the use of these methods. On the one hand there are special research problems that involve careful planning and experiment, such as occur from time to time at agricultural research institutions. There are also problems of sampling and testing; questions as to whether measurements taken are used to best advan-

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tage, how far they are adequate for the purpose intended, and to what extent some of them may be redundant. The facilities provided will consist of the holding of regular meetings, and the publication of a *Supplement* to the *Journal of the Royal Statistical Society*, to be devoted to the study of this aspect of statistical science. Four meetings will be held each session at approximately the end of November, January, March and May. The inaugural meeting will be held at the Hall of the Royal Society of Arts, John Street, Adelphi, at 5.30 p.m., on November 23. Further information, including a selected list of technical publications dealing with statistical methods in agriculture and industry, may be obtained on application to the Honorary Secretary of the Section at 9, Adelphi Terrace, London, W.C.2.

World's Poultry Congress and Exhibition

THE fifth World's Poultry Congress was formally opened by Signor Mussolini in the Palace of the Senate at the Capitol, Rome, on September 7, in the presence of some 1,400 delegates, including official delegates from the Governments of 48 countries. Il Duce also opened the Congress Exhibition at Trajan's Markets in Rome on September 8.

The Congress was organized in six sections, as follows:—(1) General and Genetic Questions; (2) Physiology, Nutrition and Breeding; (3) Hygiene and Diseases; (4) Instruction and Organization; (5) Economic Problems and Trade in Poultry Products; and (6) Rabbit Raising.

Its proceedings took place at the International Agricultural Institute (the Villa Umberto) in the Borghese Gardens, Rome. It is impossible in this short note to give any account of the many important and interesting papers that were contributed from the various countries. These and the discussions that followed will be fully dealt with in the official Report of Proceedings. Each paper was presented in the language in which it was received, with printed *présis* in Italian, German, French and English. Official interpreters attended all the sessions and interpreted speakers' remarks for the information of all the delegates present.

Great Britain and Northern Ireland were represented by about 140 delegates. The official Government delegates

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from this country were Mr. Percy A. Francis, O.B.E., representing the Ministry of Agriculture and Fisheries and the Ministry of Agriculture, Northern Ireland, Mr. N. Dobson, B.Sc., M.R.C.V.S., Veterinary Laboratory, New Haw, Weybridge, and Miss M. M. Macleod, N.D.D., of the Department of Agriculture, Edinburgh.

The Congress Exhibition at Trajan's Markets attracted a great number of visitors. The building, erected over 2,000 years ago, is a splendid example of the architecture of ancient Rome. It has six floors, each of which is divided into a number of Roman *tabernæ* or shop premises. These *tabernæ* proved to be very suitable for the purpose of an international exhibition. The national exhibits were housed on the fourth floor, to which access was obtainable direct from the street level of the Via Quattro Novembre, the building being situated on a side of the Quirinal Hill. National exhibits were staged by the following countries:—Bulgaria, Canada, Denmark, France, Germany, Great Britain, Hungary, Italy, Japan, Jugoslavia, Lithuania, the Netherlands, Spain and the Vatican State. The British stand contained exhibits illustrating the various influences—scientific, educational and practical—that have contributed to produce the inherent qualities of British poultry. It was designed by Capt. G. W. Spencer of the Ministry and planned by Capt. J. S. Lee, A.R.I.B.A., also of the Ministry. The Exhibition remained open from September 8 to September 17, Sundays included, from 9 a.m. to 12 midnight, and was crowded with visitors all the time, the charge for admission being 2 liras (about 8d.).

The live-stock exhibits were housed in the open air, under shelter, on the ground-floor level of Trajan's Forum, and comprised 23 pens of poultry sent from the United States of America, 5 from Australia, 16 from Austria, 23 from Belgium, 5 from Bulgaria, 12 from Canada, 20 from Denmark, 77 from France, 152 from Germany, 52 from Great Britain, 76 from the Netherlands, 32 from Hungary, 74 from Italy, 17 from Jugoslavia, 10 from Spain and 26 from Switzerland. All the British poultry at the Exhibition was sold.

The main purpose of the British participation in the Exhibition was to demonstrate the excellence of British poultry live stock, with the object of arousing the interest of buyers from those countries in central Europe that are known to be engaged in reorganizing their poultry industries

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on an economic basis. How far this object has been secured cannot be known until the export figures for the current year are available. There were many evidences at the Exhibition, however, of keen interest on the part of foreign representatives. The British exhibit as a whole was organized by a national committee representing the poultry industry under the chairmanship of Capt. the Hon. C. K. Greenway, who undertook personal responsibility for the collection of the funds required to meet the heavy expense involved (over £1,000) by means of voluntary contributions from the industry, no Government grant being available.

It is not too much to say that the undoubted success of the British participation in the Congress Exhibition is very largely attributable to Capt. Greenway's leadership as Chairman of the British Committee and his own personal efforts to secure the funds required, these efforts, happily, being successful even under the adverse circumstances of the present time.

British participation was also greatly assisted by the production by the *Daily Mail* of a special handbook of British poultry, edited by Mr. Percy W. D. Izzard and containing many colour and half-tone blocks illustrating the principal British breeds of poultry. 7,500 copies of this new brochure were sent to Rome by the *Daily Mail* and were distributed free of charge at the British stand in the Exhibition.

Cereal Synonyms

The following note has been communicated by the National Institute of Agricultural Botany:—

The Cereal Synonym Committee, which is appointed by the Royal Agricultural Society of England, the National Farmers' Union, the Agricultural Seed Trade Association, the National Association of Corn and Agricultural Merchants, the Cambridge University Plant Breeding Institute and the National Institute of Agricultural Botany, has come to the following decisions on the stocks of cereals which it examined in 1933:—

WHEAT.

D. Miln & Co.'s	White Suncrest is a synonym of Victor.
A. G. Leighton, Ltd.'s	Twenty-One „ „ Weibull's Standard.
D. Miln & Co.'s	Red Suncrest is a variable stock of red wheat.

OATS.

James Carter & Co.'s	Kingora is a synonym of King.
„ „ „	Victoria „ „ Victory.

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Many of the names reported by the Committee in previous years as synonyms have now been abandoned. The names given below, however, are still in use; the distinct varieties of which they were found to be synonyms when examined by the Committee are given in each case.

WHEAT.

Toogood & Sons'	Squarehead's Success	was a synonym of
	Squarehead's Master.	
James Carter & Co.'s	Red Standup	was a synonym of Squarehead's Master.
Edward Webb & Sons (Stourbridge), Ltd.'s	Standard Red	" " "White Marvel.
" " "	White Queen	" " "Wilhelmina.
" " "	Standup White	" " "Wilhelmina.
Brooker's Double	Standup	was a synonym of Wilhelmina.

OATS.

Herbert Parker, Ltd.'s	Norfolk Emperor	was a synonym of Abundance.
" " "	Norfolk Wonder	" " "
" " "	Norfolk Yelder	" " "
Edward Webb & Sons (Stourbridge), Ltd.'s	White Winter	" " Marvellous.

BARLEY.

Herbert Parker, Ltd.'s	New Fortyfold	was a synonym of Spratt-Archer.
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The use of the term "White Winter(s)" as a varietal name is particularly misleading as there are two distinct varieties, Unique and Marvellous, to which it might be applied.

Vegetable Diseases

COMMERCIAL and other growers of vegetables cannot, as a rule, be expected to make an exhaustive study of such an extensive subject as the fungus and allied diseases of their crops, and it has therefore been suggested by a prominent grower that a brief résumé of these diseases, giving essential details, would be of practical value. Such a summary has been prepared, based upon information gathered over many years by the Ministry's Plant Pathological Laboratory, and is now issued as a Bulletin.*

To each disease the now standardized common name is given, and the scientific name of the causal agent (where one is concerned) is added. Short descriptions of the symptoms of the more important diseases are supplied, and, where control measures are known, these are briefly indicated. References are also given to a large number of published scientific papers containing the results of research carried out in this country on many of the diseases. An

* Bulletin No. 68. *Vegetable Diseases*, obtainable from H.M. Stationery Office, price 9d. (by post 10d.), or through a bookseller.

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endeavour has been made to achieve completeness in this list of references so that it may be of use to research workers and the more advanced growers, and in order that it may be realized what has so far been garnered from research on vegetable diseases here, and what gaps in our knowledge of them still remain to be filled.

World's Grain Exhibition and Conference

WITH reference to the note on page 585 of the October issue of this JOURNAL, it is regretted that mention was not made of the presence at the Exhibition and Conference of Mr. Lawrence C. Tipper, M.R.C.V.S. Mr. Tipper, who was one of the two representatives of the Central and Associated Chambers of Agriculture, also represented the Birmingham and Midland Chamber of Agriculture and took an active part in the Conference discussions.

Insurance of Cattle and other Live Stock by Goods Train

THE following notice was issued by the Railway Companies' Association on October 10:—

Arrangements have been made by the railway companies of Great Britain to introduce on November 1 next a scheme of insurance on most favourable terms by which senders of live stock may be protected against risks incidental to the transit of animals by goods train. The animals which may be insured, the premiums and the insurable maximum values covered are:—

<i>Animals.</i>	<i>Premiums.</i>	<i>Insurable Maximum Value.</i>
Cattle	4d. per head	£25 per head
Calves	½d. " "	£2 " "
Sheep and Lambs ..	½d. " "	£3 " "
Pigs (Bacon)	½d. " "	£6 " "
" (Porkers)	½d. " "	£3 " "

Minimum premium 2d. per consignment.

The insurance covers risk of death or injury (except for disease or destruction due to foot-and-mouth disease, or under any Contagious Diseases Act, or death or injury caused by persons participating in any railway strike) whilst the insured animals are in transit and during loading and unloading.

Complaints must be made in writing within 3 days of delivery and claims within 10 days.

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The scheme does not apply to imported live stock sent by rail from British ports.

The scheme is experimental for 12 months and its continuance will depend upon the support that it obtains from farmers, live-stock dealers, butchers and others interested in the transit of live stock.

Conference on Agricultural Meteorology

A CONFERENCE on Agricultural Meteorology was held at the Meteorological Office on Friday, October 6. Representatives from practically all the centres that are co-operating in the Agricultural Meteorological Scheme were present at the Conference, together with members of the Agricultural Meteorological Committee—which supervises the Agricultural Meteorological Scheme on behalf of the Ministry of Agriculture and Fisheries, the Department of Agriculture for Scotland, the Forestry Commission and the Air Ministry—and a number of others interested in the subject.

Papers were presented by Sir Napier Shaw, F.R.S., on "The Growers' Year Book" and by Mr. Herrod Hempsall, F.E.S., Technical Adviser on Beekeeping to the Ministry, on "The Weather in Relation to Bees," whilst informal talks were given by Professor V. H. Blackman, Sc.D., F.R.S., on "The Effect of Temperature on Plant Growth," illustrated by lantern slides, and by Dr. R. A. Fisher, F.R.S., on "Precision Observations."

Deputations on Tithe

THE MINISTER of Agriculture and Fisheries received on October 19 deputations from the National Farmers' Union and the Central Landowners' Association, each of which put before him the difficulties that tithe payers are experiencing at the present time. In each instance the Minister stated that he was receiving deputations on the subject of tithe from other parties concerned and promised to give the most careful consideration to the representations made.

On October 24, the Minister received a deputation of representatives of tithe-owning bodies who put before him their views on the present position with regard to tithe rent-charge. The deputation represented Queen Anne's Bounty and the Ecclesiastical Commissioners, the Welsh Church Commission, and the Oxford and Cambridge Colleges.

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*An Introductory Broadcast on September 28 by
the Right Hon. WALTER E. ELLIOT, M.C., M.P.,
Minister of Agriculture and Fisheries, to a Series of
Broadcast Talks by Professor J. A. Scott Watson.*

THIS is a week of review and stock-taking. The B.B.C. surveys of Character and Empire and Institutions have all been launched, and the survey which I have to open to-night should interest us no less than any of these. It is a survey of the country, the countryside and its crops, the countryside and its stock, the countryside and its villages and roads, its schools, its 'buses and its wireless sets, and all that arises out of them.

The countryside as it is cultivated and inhabited is, the truest picture of a people. Others are to speak of Character, Institutions, Empire. Here is, or should be if we can show it to you, the land that expresses our character, that bred our institutions, that builds our Empire-builders. North, south, east and west, England, Scotland, Wales—we seat a man out to see and he has seen; he will come to the microphone and tell you all about it, all between October 5 and December 21 of this year. This set of journeys he only started in August—and you may say he won't have seen much. Other travellers have gone out before to look for England but they have taken longer and ridden more slowly. Arthur Young took six months for the North of England alone, and Cobbett travelled hard for years at a time when taking his famous Rural Rides. After all, it is not one journey or one survey that a man describes—rather what he has seen all his life long. Otherwise he could not describe one country in a year—nor one county, nor scarcely even one parish, so rich and varied is the catalogue of this island. If you think I exaggerate, remember that Sir Walter Scott rode seven years on end down Liddesdale, and came back, it is true, with a mighty harvest of stories and songs and descriptions of how folk lived and how they died and their fathers before them. There was nevertheless very little about agriculture in all that he brought home, for, indeed, a man brings home in sheaves

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what he himself puts down in seed, and Sir Walter Scott's land grew more in ballads and novels than ever it did in turnips and sheep.

Our envoy must move fast and paint with a big brush, for he has a big field to cover. He ought to know a bit about agriculture, for he teaches it at Oxford and he taught it before at Edinburgh. He writes and reads and speaks about agriculture, and he and his College farm land as well. He writes and reads of more than agriculture, since his subject is rural economy—Rural Britain—that is to say, the people as well as the flocks and herds, and the houses and schools as well as the fields. It is agriculture that interprets it all to him.

John Scott Watson is a squarely but lightly built man, not very tall. 40 odd years of age, and looks as if he ought to be worth a good wage as a cattle-man or rather perhaps a shepherd. Picture him, if you will, as a shortish fellow in heavy boots that turn up at the toes, an old suit rather ragged about the wrists, an ashplant, and a very shabby macintosh; the sort of man you see leaning against the top rail in a market place about 11 o'clock in the morning, with an instinctive feeling on your part that it has been pretty heavy rain where he came from. I am bound to say I never actually saw Scott Watson looking like this. He is generally most respectable when he comes to see me at the Ministry of Agriculture or I go to see him at St. John's College, Oxford, where he belongs. For all that, that is the picture of him I have in my mind's eye, and if you have it in yours you will not go very far wrong.

Scott Watson set out from Ormskirk on Monday, August 14, of this year. He was on his road north, for he was going to start his inspection of England in Scotland. He was making then for the Highlands, for Arran and Kintyre, and on by Islay, Oban, and Inverness. He came down by Aberdeen, by Elgin and Stirling, and so to Edinburgh and thence to Dunbar and Kelso, and so across the Border to Newcastle, to Darlington and to York. He is still on the road. He will have to go from Lincoln to Ipswich, and from Peterborough to Stonehenge. He will see Bristol-way and Exmoor, Bridgwater, Chichester and Romney Marsh. He will be down the Vale of Evesham, go to Bangor in North Wales, and he may even take ship to Jersey, Guernsey, Alderney or Sark. He goes for these modern Rural Rides in a little old motor-car which he drives

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himself; and a hot time he must have had of it in the blazing days of this tremendous and terrifying summer.

What has he seen? What should I have liked him to see? What should I like him to tell me about if I switch on a wireless set at half-past seven any Thursday between October and Christmas Day?

In the first place he must have seen a great deal of production and I should like to hear about that. The food for twenty million people, roughly speaking, is produced every year, in one way or another, by something like a million workers or just over—a job of work worth reviewing even in these days of big affairs. We are too apt to think to-day that nothing can be accomplished without a great deal of noise, of smoke, of organization. In the towns especially we begin to conceive work—other people's work of course—as typically something done with a pneumatic drill in the centre of a road. There is, however, the other kind of work, the work which men set going and which afterwards itself fulfils so much of its accomplishment. So much of agriculture is of this nature that we do not always realize the scale and intensity of its processes.

The Greeks put agriculture above industry because in industry man worked against Nature but in agriculture man worked with Nature. Machines nowadays are very clever, and will do a great deal more than they would do in the days of the Greeks—but there is no machine that will do as much as the bushels of seed corn, covering, in months of growth, in their own way and by their own laws, counties of bare earth with a harvest of bread.

There is also a colossal toil of man and beast which, were it all in two or three great centres, would impress and stagger us. I have often given figures showing the size of the industries of the countryside, and I shall not repeat them all again. Here is one just as a sample: there are more people employed in the dairy industry alone than in all the manufacture of iron and steel, and shipbuilding put together.

Here is another figure which I came on when thinking about these talks. There are three-quarters of a million horses in use in agriculture in Great Britain. There is only just over $2\frac{1}{2}$ million horse-power kept available for all the textile industries of this nation—and $1\frac{1}{2}$ million for the engineering and shipbuilding industry. Certainly, a horse-power is a larger unit of energy than a horse, but the idle-

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ness of machinery—of industrial plant—in late years has so far exceeded the idleness of farm horses, that I believe that here also for sheer energy-use, agriculture surpasses many more-loudly-trumpeted activities.

How is the modern farmer tackling the business of directing and assisting this vast output of energy? Scott Watson will, I hope, be able to tell us what is happening to the technique of this ancient art and craft of agriculture; how modern methods are being grafted on to the sturdy old stock. In his choice of seeds and stock, in his methods of cultivation, in his use of fertilizers, in his unending battle against weeds, pests and diseases, the farmer has now at his service the results of years of patient scientific work in the Research Institutes. Petrol and paraffin and electricity—160,000 horse-power in tractors alone—have come to the farm to supplement, and in some cases to supplant, the Clydesdales and the Suffolk Punches. Scott Watson will, I hope, be able to tell us how in all these things agriculture is adding science to tradition and experience.

What of the men and women themselves, farmers and farm hands, husbands and wives, market gardeners and smallholders? Are the Agricultural Colleges and the Farm Institutes, the movies and the motors producing a new type? What are the young folk doing? What are they thinking? I hope Scott Watson will help us to listen in ourselves to the buzz of talk at "kirk and market" and, discreetly, to the gossip and stories round the table at the Farmers' Ordinary at the Blue Boar, and, still more discreetly, to the chatter when the young men and maidens stand up to take the floor at the social when the benches and tables have been got out of the way.

We in the Ministry have our own special preoccupations as to what we want to hear. Great changes are happening in British agriculture in these days. Like the rivets and plates and girders of Kipling's "Ship that found herself," a multitude of separate units, just coming into existence are, we hope, to find themselves and then settle down together as parts of one great whole. The hop producers, the pig producers, and the milk producers, have all organized themselves under the Agricultural Marketing Acts. Potato growers have framed a scheme, a Reorganization Commission is examining the whole wide field of fat stock—poultry and eggs, sugar-beet, fruit, all are having their sources of supply—home, Dominion or foreign—and

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their ways of working overhauled. This great movement towards better organization in agriculture has been encouraged by Governments and facilitated by legislation, but the driving force is coming, and can only come, from the farmers themselves. Over 99 per cent. of those voting, voted in favour of the Pigs Marketing Scheme; over 96 per cent. in favour of the Milk Marketing Scheme for England and Wales, and 77 per cent. in favour of the Scottish Milk Marketing Scheme.

What does this mean? It means that farmers throughout the country realize that it is not enough nowadays to produce a thousand gallons of first-class milk or to put up a bunch of the finest beef cattle in the world. They will have to see how the great United Kingdom Market for their products can be supplied in an orderly and reasonable manner. They are thinking over these problems for themselves; they are studying the reports of the Commissions; and they are acting. We in Whitehall see only the ballot-papers. It will be extremely interesting if Scott Watson can give us some of the opinions that were held or changed, and of the arguments that ran high when the National Farmers' Union were carrying through their great canvasses of a quarter of a million producers at a time. What does the rural equivalent of the man in the street, the man in the field, think about all this? Let's have it all—and a mighty lot of dog's abuse about inspectors there will be in it, I know very well.

The Man in the Field! And his Wife! In 1918, there were about 180 local Women's Institutes. To-day the Women's Institute movement has over 5,000 branches with nearly 300,000 members in England and Wales, and there are nearly 1,000 branches in Scotland: and any mere man who has stood, as I have stood, in the Albert Hall at their Annual Meeting, and seen that vast building packed from floor to ceiling with representatives from every county in England and Wales, sitting under their banners, holding up their green cards to vote, has brought home to him—in rather a terrifying way—the enormous strength and vitality and power of these new organizations. These Institutes with their manifold social and educational activities must be having—must already have had—a tremendous influence on the life and thought of women in rural Britain. Scott Watson should be able to tell us something about this.

Then as to the rural community as a whole—villages and

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cottages and county towns. Are the National Council of Social Service and its 25 Rural Community Councils fostering communal and cultural life in the villages? They have, for example, helped over 200 villages to provide themselves with village halls. Here is an interesting development in rural life. There is also the Rural Industries Bureau, which has done much to encourage the revival of village craftsmanship. Has Scott Watson anything to tell us of the new interests brought into village life by these agencies? Will they take root or will they be a spectacle of amused though tolerant interest?

Again, can the countryside absorb the unemployed? Can it continue to carry the people that it has? Has agriculture turned the corner?

What about the steps which, at long last, the towns have joined with us to take to control imports? Nowadays the Ministry of Agriculture spends a great deal of its time—and necessarily spends it—negotiating with our overseas consignors, as a sort of junior Foreign Office. Do they know about all that in the counties and in the shires—do they realize how delicate must be the task for a country which gets so much of its purchasing power from its exports abroad? Yes, this is a very important survey. Not only because agriculture is so old—not only because it is so important—but because it is so new. It is a new thing that Britain should be looking to the countryside as well as to the towns for her employment; just as new as that Scott Watson should speak in London and be heard simultaneously in the Channel Islands and in the Hebrides; just as new as that nitrate should be dragged out of the air by the ton or by the hundred ton at Billingham instead of being slowly gathered by the clovers or spread from the middens.

We are clearly in the middle of a new economic revolution, agricultural even more than industrial, of which the political revolutions now proceeding in Europe and America are merely aspects. The revolution in Chile was due, at least in part, to the chemists and engineers who made it possible to draw on the nitrogen of the air, and abolished by the turn of a switch the dependence of world agriculture on Chilian nitrate. The revolutions in Cuba are certainly due, in greater or less degree, to the botanists who brought the sugar-beet to supplant the sugar-cane, the engineers who perfected and cheapened the extracting, and then the Dutch plant breeders in Java on the other side of the world who

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bred the sugar-cane P.O.J. 2878, so called because it was the 2,878th step they had made to breed the perfect sugar-cane, high yielding and disease resistant. If you say that it is also due to the sugar-beet subsidies I shall not quarrel with you there: I shall say we want to hear Scott Watson upon the subject.

The nineteenth century is the abnormal period and not the present day. The nineteenth century has passed. Its vast exports of capital, its dizzy increases of population, its tides of emigration running like a mill-race till a million people a year were being poured into and absorbed by the United States alone, will not recur in our time. We have to learn to live in our own country. All of us have to learn to live within our own lands.

It may be—and I rather hope it may prove to be so—that with all this newness the more the countryside changes the more it will be the same thing. The long slow rhythms of the year, seedtime and harvest, spring and autumn, short days and long, have a wonderfully steadying effect on people, and may still overweight the drag of the machines. The village blacksmith is just as much a centre of interest and envy to children coming home from school as ever the village garage is, and I do not believe that the cinema or the penny paper will pull the sun out of the sky.

The earth is very tolerant. Look at the spoil-heaps of the coal-mines, where the soil that grew the tree-ferns of the coal-seams, a hundred million, a hundred and fifty million years ago, has been brought to the top, and exposed again to sun and wind and rain. It spawns no monsters from the dawn of time. It nourishes grasses and dandelions, chickweed and dockens, the kindly plants and life of our own day; yet imagination crumples at the thought of how long ago it was since these acres last carried life, when the coal forests were all new and scarcely a beast or a tree or a mountain or a continent that we know had been dreamt of. The processes of life then were the same as those on which we rely for our daily bread, and maybe for our sanity, to-day. These processes were the study and the speech of Cobbett and Arthur Young a hundred years ago; they are yet the theme of this series, in our own day and generation, in the autumn of this our year of 1933. They will be the same, a thousand or ten thousand years hence.

A NOTE ON THE USES OF POMACE

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INFORMATION collected recently in connexion with the National Mark Scheme for Cider, and individual inquiries received from cider-makers and farmers, have shown that there is considerable wastage of pomace in some of the cider-making districts in the West of England. This wastage is frequently due to lack of knowledge of the various methods of utilizing this by-product of the industry. A comprehensive review of the subject was given by Mr. C. T. Gimingham and the present writer in an article entitled *The Use of Pressed Apple Pomace*, which appeared in this JOURNAL in 1915 (Vol. XXII, No. 9, Dec. 1915). Since that date, little has been published on the subject, although the general situation in respect of this material has meanwhile changed considerably. A brief account of the present-day position may be of service to cider-makers who still find the material a troublesome waste product at a time like the present, when returns from any form of farm produce are welcome.

For the information of farmers who are not directly in touch with the cider industry, it should be explained that "pomace" is the technical term applied to the mass of disintegrated material obtained as a result of the passage of the apples through the milling machinery before the operation of pressing. In ordinary practice, this pomace is promptly submitted to the action of a powerful press for the pressing out of as much as possible of the juice. The residual cake of solid material is termed "pressed pomace," or frequently "pomace" only, or "must" or "mark" in some districts. This is the by-product with which this article is concerned.

The various uses of pomace have been determined largely by its chemical characteristics. As a fruit residue, which still contains a quantity of juice that cannot be expressed by the usual methods of ordinary practice, pomace obviously possesses some food value. It also contains substances that can be utilized for certain food

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products. The following details of its composition, shown in comparison with those for wet brewers' grains and mangolds, are quoted from the article referred to above:—

	<i>Pressed Pomace. Per cent.</i>	<i>Wet Brewers' Grains. Per cent.</i>	<i>Mangolds (medium). Per cent.</i>
Water	76.05	76.2	88.0
Fat, etc. (Ether extract) ..	1.12	1.7	0.1
Protein	1.53	5.1	1.2
Crude Fibre	4.42	5.1	0.9
Ash	0.71	1.2	1.1
Carbohydrates (Sugar, etc.)	16.17	10.6	8.7

Although the composition of individual samples of pomace varies considerably, the above figures are fairly representative. They indicate, for example, that the feeding value of pomace is distinctly higher than that of mangolds. While it falls below that of wet brewers' grains in respect of protein, it is superior to that of the latter in carbohydrate content. As regards individual constituents, not specified separately in the above table, special mention should be made of pectin, since the presence of that substance has opened within recent years a commercial demand that was non-existent in pre-war days.

It is evident, from a series of inquiries made during the past few months, that the bulk of the pomace produced in this country is absorbed for two main purposes, viz., the preparation of commercial pectin extracts and of feeding stuffs for live stock. To a much less extent, it is used as a manure. Of the variety of other possible uses, few have yet received serious consideration in this country, and consequently need no further mention here, as they fall outside the immediate purpose of this article. Anyone interested in the possible development of any of them can obtain information regarding them upon application to the Research Station, Long Ashton, near Bristol.

Pomace as a Source of Pectin.—Dealing in turn with the three major uses just mentioned, the outlet for pomace as a source of pectin calls for notice first. The apple, like other fruits, is relatively rich in this substance. Although a portion of it is removed in the juice in the course of cider-making operations, the greater part remains in the pressed pomace, from which, after steaming, it can be extracted with water. The details of the preparation of the pectin extract do not call for description here, since the process presents numerous technical difficulties and is essentially a matter

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for specialist handling. From the point of view of the average cider-maker, the sale of pomace for pectin production is likely to be more satisfactory than an attempt to make the extract himself.

Taking sale of the pomace as the more suitable plan, certain essential points need to be observed if the pomace is to command a reasonable price. Pectin is an unstable substance, being formed within the fruit during the course of the ripening process and undergoing changes to other related substances as the fruit approaches the stage of over-ripeness. Corresponding changes, also, are continuously in progress in the pomace itself, unless the latter is dried. Thus, for a sample of pomace to have the highest market value for pectin purposes it should be derived from apples milled at an appropriate stage of ripeness and should be delivered to the pectin producer before the decomposition changes set in fully. If the pressed pomace is to be supplied in an undried form for pectin extraction it should reach the pectin factory within twenty-four hours, if possible, after it comes from the cider press. The longer the delay, the greater the deterioration in quality.

On this account, several of the larger cider factories have now made provision for drying pomace on the spot. To secure an adequately dry sample, which will keep in good condition, heat is necessary to enable the drying to be carried out and completed with the necessary speed. Various types of pomace driers are in use, and it is important for pectin purposes that a type suited to the production of a high-grade of dried pomace should be utilized. The sample of the dry material should be of a pale colour and have a content of not more than 10 per cent. of moisture. Apart from these points, the value of the sample for pectin purposes is determined by its actual pectin content.

As pectin extracts are used chiefly in jam manufacture, to ensure the satisfactory setting or "jelling" of the jam, the need of a pomace sample pale in colour, free from any charred taste resulting from over-drying, and with a high pectin value, will be appreciated.

Suitable pomace driers are too costly to instal and operate for cider-makers who manufacture on a relatively small scale. The latter, if not conveniently situated in the neighbourhood of a pectin factory to which they can send their pomace undried, may be more favourably placed in

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respect of proximity to a drying plant. If so, the pomace can generally be sold for drying.

There is, however, at present a limit to the demand for pomace for pectin purposes. This is determined chiefly by the quantity of the extract that the jam trade can absorb. Recently, in consequence of the increase in the number of driers in use, there have been signs of over-production for this particular market. Both here and overseas new uses for pectin are being sought and investigated, but, until such new outlets have been developed, it should be recognized that the present output of dried pomace tends to be in excess of the pectin demand.

The prices obtainable for both dried and undried pomace for pectin extraction vary considerably, according to quality and demand. The price range appears to be from 5s. to 20s. per ton for wet pomace and from £5 to £12 per ton for the dried material.

Pomace for Feeding Purposes.—The present limitations in the demand for pomace for pectin extraction render it desirable that particular attention should be given to its utilization for stock-feeding purposes, in which direction there should be an unlimited outlet. Probably, on account of the low prices for the standard feeding stuffs that have prevailed in recent years, this aspect has been rather neglected.

The analysis of undried pomace, given earlier in this article, indicates approximately the order of this material as a feeding stuff. The dried pomace, with the actual moisture content reduced to 10 per cent., represents a correspondingly concentrated nutrient. In the previous article in this JOURNAL, the general aspects of the feeding value of the material were considered, especially in relation to dairy cows, and recapitulation here seems unnecessary. Recently, more detailed information as regards its use in various districts of the West of England has been obtained from the Agricultural Organizers of the counties concerned. To them, and to all farmers and cider-makers who have supplied them with the particulars, the writer desires to make grateful acknowledgment for the information provided. In the space here available these records can only be expressed in summarized form, but the following notes will give a fair idea of prevailing practice.

In some districts, there is local feeling against the use of

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pomace as a feeding stuff for live stock of any kind, and it is discarded altogether. This appears to be due, in some instances, chiefly to ignorance of its value: in others, possibly, its misuse has led to unfortunate experience. In other localities, where it is not made use of for feeding purposes direct, pomace is sold to other cider-makers who are equipped with drying machines. Very widely, however, it is utilized by farmers direct in the undried state, and in such instances there is considerable variation in practice.

Usually the undried pomace is fed to dairy cows. The quantity per head per feed varies widely, ranging generally from 10 lb. to 30 lb. Many farmers spread it on pastures as being a cleaner and more satisfactory method of handling, and in such instances the consumption per cow cannot be very closely estimated. There is fairly general agreement as to its utility, subject to the qualifications that there must be no over-feeding because of the risks of tainting the milk and causing scouring, and that the material should be used fresh before acetic fermentation has fully set in. Its food value is rated by some who utilize it in mixed rations (as, for example, in conjunction with hay), at about twice that of roots. When used in this way, the inclusion of sharps or middlings in the production ration is recommended.

By some it is also fed to store cattle and to pigs; for the latter it is sometimes used to replace meal in the slop.

As regards dried pomace for feeding purposes, it is generally included in compound cakes and foods, serving as a filler with more concentrated nutrients. In at least one area, some attention has been given to its use direct with apparently highly successful results. In such instances it is held to be a useful ingredient of any properly balanced ration for dairy cows, provided that it does not exceed about one-sixth of the total ration. It can replace or supplement sugar-beet pulp, and should be reckoned as a low-grade cereal. As a part of a fattening ration for winter-fed cattle, and as a ration for sheep folded on roots, it has also been used with success, the quantity used being considerably larger in proportion than that for dairy cows.

It is evident, however, that little direct evidence of scientific value is available as to its merits, through lack of any definite experimental feeding tests. This deficiency, however, may be remedied before the next cider-making season.

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The attention of those who handle larger quantities of wet pomace for feeding purposes than can be utilized in the fresh state, is directed to the fact that the material can be preserved in fairly satisfactory condition either by the silo or salt methods described in the previous JOURNAL article mentioned.

Pomace as a Manure.—Some mention of this use for pomace was also included in the earlier article. One or two additional facts have emerged from recent inquiries.

In Devon, its use as a manure for grass land has been demonstrated recently. A compost heap was made up and a thick sprinkling of North African phosphate applied to each layer. After the heap had stood for about three months, the material was carted out and spread thinly over the grass. In this form, distinctly beneficial effects were obtained. It should be noted that pomace spread in fresh condition is too acid and damages the herbage. It is therefore generally advisable to use it in conjunction with lime; and in this form, mixed also with farmyard manure, it has been applied with good effect as a top-dressing in cherry orchards in Worcestershire.

Experimental evidence as to the value and mode of use of pomace as a manure is needed, and may also be forthcoming in the near future.

THE INTERNATIONAL WHEAT AGREEMENT, 1933

THE International Wheat Agreement was concluded as the result of a number of discussions between wheat exporting and importing countries, both before and during the Monetary and Economic Conference, 1933, leading up to the International Wheat Conference held in London from August 21 to 25, 1933. The text of the Agreement is given below. It may be regarded as falling into two parts. (1) The first embraces certain undertakings by the principal exporting countries, designed to limit the total exports and to reduce the acreage under wheat, during the two crop years 1933-34 and 1934-35. The terms of these undertakings are set out in Articles 1 to 5 of the Final Act. (2) The second part constitutes an undertaking by importing countries, under a number of different heads, designed (a) to prevent any action by the latter that would have the effect of counteracting the restrictions imposed by exporting countries, and (b) to bring about a reduction in tariffs and other barriers after a certain rise in wheat prices has occurred. This is set out in Article 6 of the Final Act. The Agreement as a whole may be summed up in a sentence as an attempt to bring about a better adjustment between the supply of wheat and the effective world demand.

In regard to the details of Article 6 it is to be noted that the obligation to reduce tariffs is contingent upon the international price of wheat having reached and maintained "for a specific period an average price to be fixed." The international price of wheat for the purposes of this paragraph is defined in Appendix A, the price being fixed at 12 gold francs per quintal (equivalent to about 32s. 10d. per quarter at 79 francs to the £) and the "specific period" at 16 weeks. It will be seen therefore that importing countries are under no immediate obligation to lower their tariffs, and that until the price of wheat has risen to the above figure, their obligations are mainly those contained in paragraphs I and II of Article 6 and in the general declaration of intention at the end of that Article, not to develop their domestic policies "in such a way as to frustrate the efforts which the exporting countries are making in the common interest, to restore the price of wheat to a remunerative level."

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Three points that were of special concern to this country were made clear by the United Kingdom delegation during the discussions at the London Wheat Conference: (1) that the signing of the Wheat Agreement on behalf of the United Kingdom did not imply any alteration in the policy under the Wheat Act, 1932; (2) that the United Kingdom would not be under any obligation as a result of this agreement to reduce the present import duties on foreign wheat and flour that were imposed as a result of the Ottawa Agreements; and (3) that United Kingdom millers were not to be prejudiced as a result of the restriction of wheat exports by exporting countries.

In regard to the last point it had been suggested that a possible outcome of these restrictions might be a lowering of the internal price of wheat in exporting countries, which, in turn, might have the effect of placing millers in those countries at an advantage in competition with millers in importing countries. The United Kingdom delegation were given an assurance by Mr. R. B. Bennett, Chairman of the Wheat Conference, on behalf of the exporting countries, that it was not the intention to carry out the restrictions in such a way as to produce this result. A record of each of these points is contained in the Minutes of the Conference. Other countries also raised certain points in regard to the interpretation or carrying out of the Agreement, and these points were recorded in a similar way. It will be observed that at the end of the "Minutes of the Final Meeting" reference is made to these records so that the respective undertakings of the various signatories should be clearly understood.

At the London Wheat Conference a decision was reached to set up a Wheat Advisory Committee representative of the countries that were parties to the Agreement, to watch over the working of the Agreement. This Committee is primarily advisory in character and provides an opportunity for representatives of Governments to review the general situation in relation to the various undertakings and to discuss any points that may arise in giving effect to them. The Committee held its first meetings on September 18 and 19, 1933.

Mr. A. Cairns has been appointed Secretary to the Committee, the address of which is:—The Wheat Advisory Committee, Bush House, Aldwych, London, W.C.2.

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The Final Act of the Conference of Wheat Exporting and Importing Countries, held under the auspices of the League of Nations, together with Appendices and Minutes of the Final Meeting,* are given below. The Conference met in London at the Offices of the High Commissioner for Canada, from August 21 to 25, 1933.

FINAL ACT OF THE CONFERENCE OF WHEAT EXPORTING AND IMPORTING COUNTRIES.

Held in London at the Offices of the High Commissioner for Canada from the twenty-first day to the twenty-fifth day of August, one thousand nine hundred and thirty-three.

The Governments of Germany, Austria, Belgium, Bulgaria, France, the United Kingdom of Great Britain and Northern Ireland, Greece, Hungary, Irish Free State, Italy, Poland, Roumania, Spain, Sweden, Czechoslovakia, Switzerland, the Union of Socialist Soviet Republics, and Yugoslavia, having accepted the invitation extended to them by the Secretary-General of the Monetary and Economic Conference on behalf of the Governments of Argentina, Australia, Canada and the United States of America, to take part in a Conference to consider the measures which might be taken in concert to adjust the supply of wheat to effective world demand and eliminate the abnormal surpluses which have been depressing the wheat market, and to bring about a rise and stabilization of prices at a level remunerative to the farmers and fair to the consumers of breadstuffs, have agreed as follows:—

ARTICLE 1.

The Governments of Argentina, Australia, Canada and the United States of America agree that the exports of wheat from their several countries during the crop year August 1, 1933, to July 31, 1934, shall be adjusted, taking into consideration the exports of other countries, by the acceptance of export maxima on the assumption that world import demand for wheat will amount during this period to 560,000,000 bushels.

ARTICLE 2.

They further agree to limit their exports of wheat during the crop year August 1, 1934, to July 31, 1935, to maximum figures, 15 per cent. less in the case of each country than the average outturn on the average acreage sown during the period 1931-1933 inclusive, after deducting normal domestic requirements. The difference between the effective world demand for wheat in the crop year 1934-1935 and the quantity of new wheat from the 1934 crop available for export will be shared between Canada and the United States of America as a supplementary export allocation with a view to the proportionate reduction of their respective carry-overs.

ARTICLE 3.

The Governments of Bulgaria, Hungary, Roumania and Yugoslavia agree that their combined exports of wheat during the crop year August 1, 1933, to July 31, 1934, will not exceed fifty million bushels. This undertaking is made on the understanding that the aggregate may be increased to a maximum of fifty-four million bushels if the

* Official No. C.511. M.256, 1933, IIB, Geneva, Sept. 21, 1933. Communicated to the Council and the Members of the League.

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Danubian countries find that such a supplementary quota is required for the movement of the exportable surplus of the 1933 crop.

ARTICLE 4.

They further agree that their combined exports of wheat during the crop year 1934-1935 will not exceed a total of fifty million bushels, and recognize that the acceptance of this export allocation will not allow of any extension of the acreage sown to wheat.

ARTICLE 5.

The Government of the Union of Socialist Soviet Republics, while unable to give any undertaking in regard to production of wheat, agree to limit their exports for the crop year 1933-1934 to a figure which will be arrived at upon the completion of negotiations with the Governments of the overseas wheat exporting countries. They also agree that the question of their export of wheat during the crop year of 1934-1935 shall be the subject of further negotiations with the wheat exporting countries represented on the Advisory Committee.

ARTICLE 6.

The Governments of the wheat-importing countries in signing this instrument:

I. Agree henceforth not to encourage any extension of the area sown to wheat and not to take any governmental measures, the effect of which would be to increase the domestic production of wheat;

II. Agree to adopt every possible measure to increase the consumption of wheat and are prepared to bring about the progressive removal of measures which tend to lower the quality of breadstuffs and thereby decrease the human consumption of wheat;

III. Agree that a substantial improvement in the price of wheat should have as its consequence a lowering of customs tariffs, and are prepared to begin such adjustment of customs tariffs when the international price of wheat reaches and maintains for a specified period an average price to be fixed. It is understood that the rate of duty necessary to assure remunerative prices may vary for different countries, but will not be sufficiently high to encourage their farmers to expand wheat acreage.

Appendix A contains the agreed definitions relating to the technical points mentioned in this paragraph;

IV. Agree that in order to restore more normal conditions in world trade in wheat the reduction of customs tariffs would have to be accompanied by modification of the general regime of quantitative restriction of wheat imports, and accept in principle the desirability of such a modification. The exporting countries for their part agree that it may not be possible to make substantial progress in these modifications in 1933-1934, but the importing countries are prepared to make effective alterations in 1934-1935 if world prices have taken a definitely upward turn from the average price of the first six months of the calendar year 1933. The objective of these relaxations of the various forms of quantitative restrictions will be to restore a more normal balance between total consumption and imports, and thereby to increase the volume of international trade in wheat. It is understood that this undertaking is consistent with maintaining the home market for domestic wheat grown on an area no greater than at present. It is obvious that fluctuations in the quantity and quality of the wheat harvest resulting from weather conditions may bring about wide variations in the ratio of imports to total consumption from season to season.

The obligations of the importing countries under this Agreement are to be interpreted in the light of the following declaration;

It is recognized that measures affecting the area of wheat grown and the degree of protection adopted are primarily dependent upon domestic conditions within each country, and that any change in

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these measures must often require the sanction of the legislature.

The intention of this Agreement is nevertheless that the importing countries will not take advantage of a voluntary reduction of exports on the part of the exporting countries by developing their domestic policies in such a way as to frustrate the efforts which the exporting countries are making, in the common interest, to restore the price of wheat to a remunerative level.

ARTICLE 7.

The countries participating in the Conference agree to set up a Wheat Advisory Committee to watch over the working and application of this Agreement. The functions, organization and financial basis of this Committee are set out in Appendix B.

Done at London, the twenty-fifth day of August, one thousand nine hundred and thirty-three, in a single copy which shall be deposited in the archives of the Secretariat of the League of Nations, and of which authenticated copies shall be delivered to all Members of the League of Nations and non-member States represented at the Conference of Wheat Exporting and Importing Countries.

(Here follow the Signatures.)

APPENDIX A.

1. "International price of wheat," as mentioned in Article 6, Paragraph III, of the draft agreement, shall be understood to mean a duty-free gold price c.i.f. on a world market.

This price shall be calculated according to the method followed by the Food Research Institute of Stanford University, California (explained in Vol. 4, No. 8, of Wheat Studies). It is the average price of all parcels of imported wheat of all grades sold during each week in all the ports of Great Britain.

2. The Secretariat of the Wheat Advisory Committee set up by the Conference shall undertake the regular communication of indices of prices calculated as above to all Governments adhering to the Agreement.

3. The minimum average gold price calculated as indicated above to be maintained for a period of sixteen weeks before it will be necessary for importing countries to adjust their Tariffs shall be 12 gold francs per quintal (63.02 gold cents per bushel).

4. The period referred to in Article 6, Paragraph III, of the Agreement, during which the average quotation for wheat is to be maintained before it will be necessary for importing countries to adjust their Tariffs shall be sixteen weeks.

5. Each country will decide upon its tariff adjustment in accordance with the principles enunciated in Article 6, Paragraph III, of the draft Agreement, and every considerable and lasting change in wheat prices shall be followed by an adjustment of Tariffs proportionate to such change.

MINUTES OF FINAL MEETING.

The representatives of the countries specified hereunder met for the purpose of signing the Final Act of the Conference on August 25, 1933, namely:—

(Here follows a list of countries represented at the Conference and the names of the delegates.)

The signatures are to be regarded as affixed in the light of the statements made during the discussions by the representatives of the various countries; these statements are contained in the minutes of the Conference, and are to be interpreted in the sense of Paragraph IV of Article 6 of the Final Act.

The Act shall be deposited at the Secretariat of the League of Nations, in Geneva, and shall remain open for signature on behalf of other countries. It is understood that certain of the signatures have been affixed *ad referendum*.

These minutes have been read and unanimously approved by the Conference.

TRIALS OF BEANS FOR CANNING

J. C. WALLACE, M.C., and J. K. THOMPSON, N.D.A.,
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Object of the Trials.—The primary object of the trials was to ascertain if the varieties of dwarf beans described as “stringless,” and commonly grown in America for the purpose of canning, could be successfully and profitably grown in this country.

Most of the varieties of kidney beans commonly grown in this country are “stringy,” that is to say, they have a fibrous string along the back of the pod where the valves are joined. The process of removing this string is too slow and tedious to be carried out in the factory, especially when there are varieties in which the string does not exist.

Large quantities of haricot beans are also canned in this country, and with the object of ascertaining whether these beans could be successfully grown in the Kirton district, plots of several varieties were also included in the trials. At present all the haricot beans used by the canning industry in this country are imported.

Period of the Trials.—The trials were commenced in 1931, when plots of a number of American varieties of kidney beans, several English varieties, and also a few varieties of haricot beans were grown. By arrangement with Mr. Hirst, the Director of the Fruit and Vegetable Preservation Research Station at Campden, Glos., samples of all the varieties of kidney beans were sent to him to be tested for their canning properties. The Report of the canning test is given in the Annual Report for 1931 of the Campden Research Station.

In 1932, the varieties that had proved promising the previous year were grown in larger plots in order to compare their yielding capacity. Several additional varieties were included.

Notes on the Trials.—The seeds were sown in both years towards the middle of May. In 1931, the varieties were grown between blocks of Harrison’s Glory peas. This method gave a certain amount of protection to the beans,

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but on account of the abnormally wet summer, the peas made excessive growth and, not being staked, they overgrew the beans in some instances. Not only was the season abnormally wet but it was abnormally cold, and the ordinary kidney bean, which crops well in the district in an ordinary season, was almost a complete failure. The growth of the varieties included in the test, many of them American varieties susceptible to a low temperature, could not, therefore, be regarded as normal.

In 1932, the beans were grown in blocks by themselves; and while the year was also cooler and wetter than the average, many varieties made good growth and produced a satisfactory crop. Samples were not sent to Campden in 1932, as it was understood that similar varieties were being grown there.

Notes on certain Varieties of Kidney Beans.

<i>Bush Lima.</i>	A great favourite in America. Failed in both seasons.
<i>Stringless Lima.</i>	Pod fleshy, green, medium length. Short cropping period. Crop fair in 1931, good in 1932.
<i>Stringless Asgrow Wax.</i>	Pod yellow, small. Crop poor in 1931, fair in 1932.
<i>Stringless Refugee Wax.</i>	Pod yellow, small, variable. Fair in 1931, good in 1932.
<i>Stringless Green Refugee.</i>	Very promising growth in both years. Pods rather small in 1931, but good size in 1932.
<i>Golden Waxpod.</i>	English seed. Very poor in both years. Slightly stringy.
<i>Green Gem.</i>	English. Very poor in both years. Not stringless.
<i>Plentiful.</i>	English. Slightly stringy.
<i>Full Measure.</i>	Good growth. Poor colour when canned.

The following varieties were included in 1932:—

<i>Magnum Bonum.</i>	Good growth.
<i>Satisfaction.</i>	Fair. Slight attack of anthracnose.
<i>Early Giant.</i>	Fair.
<i>The Prince.</i>	Good.
<i>Peerless.</i>	Average.
<i>Green Gem.</i>	Poor.
<i>Premier.</i>	Good. Rather badly attacked by anthracnose.
<i>Conserva Stringless</i>	Good plant and good growth. Pods medium length and fairly broad. Seeds very prominent in growing pod. Excellent cooking quality. This variety is used in Germany for canning.

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KIDNEY BEANS: YIELDS IN NUMBER OF 40 LB. BAGS PER ACRE IN 1932.

Variety.	Country.	Average Cropping Date of Maximum		Yield.	Remarks.
		Period.	Cropping.		
Early Giant	English	Aug. 11—Sept. 15	Aug. 19	62 bags 18 lb.	
Golden Waxpod	"	" 11— " 6	" 19	59 " 19 "	
Peerless	"	" 11— " 15	" 19	196 " 10 "	
Magnum Bonum	"	" 11— " 15	" 19 to 30	178 " 16 "	
Satisfaction	"	" 11— " 6	" 11 to 19	243 " 34 "	
Plentiful	"	" 2— " 15	" 11	273 " 32 "	
The Prince	"	" 2— " 15	" 19	547 " 3 "	
Premier	"	" 2— " 15	" 11	261 " 27 "	
Green Gem	"	" 19— " 15	" 19	32 " 30 "	
Stringless Green Pod	American	" 11— " 15	" 19	233 " 14 "	
Full Measure	"	" 11— " 15	" 11	285 " 30 "	
Stringless Lima	"	" 11 " 19	" 30	326 " 30 "	A small pulling later
Asgrow Wax	"	" 19 " 19	" 30	297 " 36 "	do.
Stringless Refugee	"	" 19— " 15	" 19	317 " 32 "	
Stringless Green	"	" " 6	Sept. 6	371 " 5 "	A full final pulling not included
Refugee					
Conserva Stringless	German	" 19— " 15	Aug. 19	558 " 25 "	
Holsatia Pearl	"	" 19— " 15	" 30	411 " 19 "	
Perfection Pearl	"	" 30— " 15	" 30	251 " 9 "	

Note.—The yields per acre must only be considered as comparable and not as actual yields per acre. The yields given have been obtained from small plots multiplied to bring the result to an acreage basis. Yields of 500 bags per acre are not obtainable in commercial practice.

TRIALS OF BEANS FOR CANNING

Pearl Beans :

- Holsatian Pearl.* This is somewhat similar in appearance to the German variety *Conserva*, but is rather stronger growing. The crop was slightly later than *Conserva*. The pods are short and broad, but flat and stringless.
- Rice Pearl.* Growth good and strong. Late in cropping. Pods very small, 2-2½ in. long. No attempt was made to pull this bean and it was left for seed. Plant cropped well, but seed did not ripen.
- Perfection Pearl.* Growth good. Pods short. Seeds very prominent in growing pods. Many pods misshapen.

Haricot Beans.—These have been grown for two seasons. Both seasons were unsatisfactory for them, being cold, wet and sunless, particularly 1931.

In 1931, four stocks were sown on May 17, in rows 18 in. apart. This distance was insufficient, the bean plants forming a thick mat over the whole of the ground, effectively excluding light and air. The failure of the plants to produce ripe seed may be attributed partly to this cause.

In 1932, four stocks were again grown. The seed was sown on May 10, and 20 in. were allowed between the rows. A greater spacing would appear to be necessary, as, at 20 in., the crop almost covered the ground.

Observations in 1931:

- Danubian.* Germination good. Growth good and promising. Foliage light yellowish-green. No pods had formed by August 20. Although pods were ultimately formed, no ripe seed was obtained.
- Ohtenashi*
(*Japanese*). Germination good. Growth good and stronger than *Danubian*. Foliage medium green, and larger than in *Danubian*. Was podding fairly well on August 10, but no ripe seed was obtained.
- Unnamed.* Proved to be a stock of *Danubian*. Remarks as for *Danubian*.
- White Seeded*
(*English Stock*). Germination good, but growth very poor. Pods forming on August 6, but no ripe seed obtained.

Observations in 1932:

- Danubian.* Germination good. Growth slow at first, but greatly improved later. Podding well on August 30. Pods were well filled by September 21.

TRIALS OF BEANS FOR CANNING

Ohtenashi.

Germination fair. Growth good, the strongest growing of all the stocks. A number of pods well filled by August 10, and podding well advanced by middle of August. At end of August, plants still showed some flower, and were still podding. Pods numerous. Earliest pods were mature by September 21. This was the most forward of all the stocks.

Canadian.

The seed of this stock was imported from Canada under this name, and proved to be similar to Danubian. Germination fair. Growth slow in early stages but improving. Not quite so vigorous as Danubian. Very similar to Hungarian stock, but foliage darker green in colour. This stock produced numerous climbing stems. In flower on August 11. Flowering finished by August 30. Was definitely earlier than the Hungarian stock, and pods were larger.

Hungarian.

The stock sent in under this name proved to be also similar to Danubian. Germination fair, growth backward in early stages, afterwards improving. Some climbing stems. Foliage light yellowish-green. Leaf small. In flower on August 10. Flowers variable in colour—fawn to white. This stock was later than the Canadian.

As the autumn advanced, the prospect of the crop ripening became unfavourable. Frosts in September destroyed the foliage and the pods appeared soft and pulpy, so that the harvesting of the crop was then regarded as useless. The weather, however, subsequently improved, and as, at the end of October, it was observed that considerable ripening had taken place, harvesting was finally decided upon. On account of pressure at this late season, this was delayed until early in November, by which time a considerable quantity of the seed had been shed. The late harvesting, and bad weather, made it necessary to dry the crop indoors and, when subsequently threshed, the samples, generally, proved to be poor, as was to be expected.

The only variety that gave a fairly good sample was Ohtenashi. A considerable proportion of good, plump white seeds were sorted out. This variety has been sown this year (1933). All other varieties and stocks were too weathered and discoloured to merit consideration.

The results obtained can only be considered as suggestive, and are in no way indicative of possible yields.

TRIALS OF BEANS FOR CANNING

General Conclusions.—The past two seasons were exceptionally wet and cold. In 1931, the ordinary French bean, which normally crops quite successfully in the area, failed entirely. Good results could not, therefore, be expected from haricot beans in that season.

1932 was also a wet season, but improved in the autumn. The haricots developed slowly in the summer, but made good progress in the autumn. The pods were not, however, ripe by the time of the first frosts.

The indications for the successful growing of the crop in this district are not very hopeful. In a dry season, no doubt, excellent results could be obtained, but the crop would seem rather a precarious one, and too dependent upon weather to be anything but a gamble in this district. The most promising variety is Ohtenashi.

Experiments on a larger scale, in order to obtain more information as to yields of beans per acre, have been carried out in the present year (1933).

REPORT ON THE WORK OF THE EDUCATION AND RESEARCH DIVISION OF THE MINISTRY FOR THE YEAR 1931-32*

PART II.—AGRICULTURAL EDUCATION

AGRICULTURAL education in England and Wales is provided by two agencies: county councils and agricultural colleges (which term includes University departments of agriculture). The county councils work mainly through the county education committee or the county agricultural committee; practically all of them employ an Agricultural Organizer and a staff of expert assistants for horticulture, dairying, poultry husbandry, etc. The Organizer and his staff are the "general practitioners," whose aim is a healthy and prosperous industry, and whose advice is available to all farmers in whatever branch of the industry they are engaged. In addition to their advisory activities, the staff instruct the adolescent, either at the county farm institute (where one exists) or at other centres throughout the county. Higher education is provided at agricultural colleges (including University departments of agriculture). The system is entirely voluntary. The Ministry's part is to co-ordinate the activities of local authorities and institutions and to assist and stimulate them by means of grants-in-aid.

This brief description of the scheme may be helpful in the consideration of the following Report on the work for the year ended March 31, 1932.

The year 1931-32 was marked by the financial crisis of the autumn of 1931, and the consequent economy measures adopted by local authorities towards the close of the year. During the first six months the authorities were still devoting their attention to developing their schemes on lines suggested in a Departmental circular letter of November, 1929, which intimated that within limits the Ministry would be prepared to aid such approved developments as might commend themselves to the authorities. This first period of 1931-32 may therefore be described as one of moderate expansion, although the bulk of the development work arising out of the circular had already been carried out; this work has been described in previous reports.

* Part I of this Report, relating to "Research (including Local Investigation and Advisory Work)," appeared in the issue of this JOURNAL for October, 1933.

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As a result of the financial crisis local authorities were informed at the end of September, 1931, that the Ministry's grants-in-aid of maintenance expenditure would be reduced as from October 1, 1931, from the rates which had hitherto applied—80 per cent. of the salary and expenses of all agricultural organizers and of certain horticultural superintendents, and 66 $\frac{2}{3}$ per cent. of all other expenditure—to a uniform rate of 60 per cent. Moreover, the authorities were informed that it would be impracticable for the Ministry to consider any applications for grants-in-aid of capital expenditure, save in the most exceptional circumstances where the schemes involved only small expenditure and were absolutely necessary in order to prevent the termination of valuable existing services. In all such instances the rate of grant-aid would be 60 per cent. instead of the 75 per cent. hitherto paid in some cases, and 66 $\frac{2}{3}$ per cent. in others.

It was realized that the general need for economy and the reduction in the rates of grant might compel local authorities to effect certain economies, and suggestions were offered as to the directions in which curtailments might be made with the least injury to their services. The authorities responded to the call for economy, most of them reduced staff salaries and gradually effected other savings without injuring the main fabric of their schemes. The "cuts" had scarcely begun to operate by the end of the financial year 1931-32; but the table on p. 731 shows the expansion which took place in 1930-31, and indicates that economy measures had begun to take effect towards the end of the following year.

As announced in the previous Report, the financial crisis also rendered it necessary to reduce the maintenance grants paid by the Ministry to agricultural colleges and University departments of agriculture in England and Wales, and to postpone consideration of all new capital developments in respect of which State aid had been sought. Further reference to these matters will be made later.

The work of the year 1931-32 may now be described briefly under the appropriate heads.

A.—Higher Agricultural Education at Universities and Agricultural Colleges

(i) *Maintenance Grants.*—Institutions for higher education have hitherto been aided by means of annual "block" grants, and since the War the intention has been that these

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grants should be fixed for a period of five years, so that the institutions should be able to make their plans in advance with a reasonable sense of security. The second quinquennial re-assessment was due to take place in the year 1930, but for various reasons the Re-assessment Committee was unable to present a report until the summer of 1931. The existing grants were, therefore, with one exception, continued in respect of the academic year 1930-31 and are shown in the table below. The grant to the Royal Veterinary College was increased from £3,300 to £5,150, for reasons explained in the Report for the year 1930-31.

The financial crisis precluded the possibility of giving effect to the financial recommendations of the Reassessment Committee, and despite the fact that certain of the institutions were finding it difficult to carry on, the national situation compelled an all-round reduction in the maintenance grants. Reductions ranging from 2 per cent. to 10 per cent. were accordingly made in the "block" grants payable in respect of the academic year commencing on October 1, 1931, and the reduced grants are shown in the following table. The saving thus effected amounted to £2,800, representing 5 per cent. on a total of £55,700.

<i>Institution.</i>	<i>Grant in respect of academic year.</i>	
	1930-31.	1931-32.
	£	£
Armstrong College, Newcastle-upon-Tyne ..	3,500	3,400
Cambridge University: School of Agriculture ..	6,500	5,850
Harper Adams Agricultural College*	4,000	3,900
Leeds University	3,800	3,600
Liverpool University (School of Veterinary Science)	2,850	2,700
Midland Agricultural College	3,000	2,850
Oxford University: School of Rural Economy ..	4,000	3,600
Reading University: Faculty of Agriculture and Horticulture	4,000	4,800
Reading University: British Dairy Institute ..	900	
Royal Agricultural College, Cirencester	2,000	1,900
Royal Veterinary College	5,150	5,000
South-Eastern Agricultural College, Wye	4,000	3,700
Seale-Hayne Agricultural College	2,300	2,200
Studley College (for women)	1,000	950
Swanley Horticultural College (for women) ..	1,750	1,700
University College of Wales, Aberystwyth ..	7,000	6,800
University College of North Wales, Bangor ..		
	<u>£55,750</u>	<u>£52,950</u>

* (Grants of £2,650 and £2,575 were also paid to the National Institute of Poultry Husbandry at Harper Adams Agricultural College in respect of the financial years 1930-31 and 1931-32 respectively.)

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(ii) *Capital Grants*.—The financial crisis precluded the Ministry from aiding the following desirable capital schemes which were under consideration at the time:—

Royal Veterinary College.—Reference has been made in previous reports to the postponement of a grant of £150,000 promised for the purpose of rebuilding the Royal Veterinary College on its present site at Camden Town. During the year under review the Governors made widespread appeals for funds to enable them to proceed with sections of the work.

Studley College for Women.—Extensions and developments, including a new wing at an estimated cost of £22,000. It was found possible, however, to approve the provision of much-needed poultry equipment, and an instalment of £28 was paid by the Ministry during 1931-32, thus completing a total grant-in-aid of £445.

Reading University: Faculty of Agriculture and Horticulture.—Erection of permanent laboratories for agricultural chemistry and the provision of an up-to-date poultry department, the total estimated cost being £11,600. A generous benefaction from a private donor has since enabled the University to provide the laboratories.

All the colleges were informed that the Ministry would be unable to consider any applications for new capital grants during the academic year 1931-32. Grants totalling £3,101 were, however, paid during the year ended March 31, 1932, to seven higher institutions in aid of schemes to which they were contractually committed before the crisis, the chief item being £1,700 towards the cost—about £7,000—of purchasing and equipping a hostel for students at the Swanley Horticultural College for Women. The provision of this hostel was rendered necessary by the decision of the Governors to re-establish the college as a centre for instruction in farm household management, following on the recommendations of Lady Denman's Committee on the Practical Education of Women for Rural Life. Although the Department's sanction had been given to a further scheme of alterations and additions to the existing Swanley buildings, the promise of grant-in-aid had subsequently to be withdrawn as the Governors were not contractually committed at the time of the crisis.

(iii) *Students*.—The following statement shows the numbers of students in attendance at institutions for higher agricultural (including veterinary) education during the past five years:—

1927-28	..	..	..	1,863
1928-29	..	..	..	1,957
1929-30	..	..	..	1,896
1930-31	..	..	..	1,948
1931-32	..	..	..	2,064

The returns show that the 2,243 courses attended by the 2,064 students in 1931-32 included the following:—

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<i>No. of courses.</i>				<i>Subject of course.</i>
971	Agriculture
369	Horticulture
237	Dairying
129	..	..	..	Poultry husbandry
382	..	..	..	Veterinary science

Although the continuing depression in the industry and the financial crisis had their effect on the entries at certain of the institutions, it is surprising that on the whole the numbers were so well maintained. The year 1931-32 again showed a marked increase in the number of veterinary students.

B.—Agricultural Education Provided by Local Authorities

(i) *Maintenance Expenditure.*—The following table shows the expenditure incurred by county authorities during the past seven years in maintaining their schemes of agricultural education, together with the amounts of grant-in-aid paid by the Ministry:—

Year	Expenditure			Grants		
	England	Wales	Total	England	Wales	Total
	£	£	£	£	£	£
1925-26	260,404	47,069	307,473	174,156	32,444	206,600
1926-27	272,777	47,246	320,023	182,015	32,590	214,605
1927-28	265,705	45,664	311,369	177,989	31,529	209,518
1928-29	255,948	41,513	297,461	171,569	28,767	200,336
1929-30	261,838	40,614	302,452	175,480	28,175	203,655
1930-31	319,275	49,570	368,845	213,842	33,664	247,506
1931-32	309,560	50,603	360,163	194,700	32,563	227,263

As previously indicated, the increased expenditure in 1930-31 was due to extensions and improvements of their existing schemes which the counties decided to make in response to the Department's circular letter of November, 1929; and the decline both in expenditure and grants-in-aid to be noted in 1931-32 is accounted for by the economy "cuts" which began to operate towards the end of the year, and the reductions in the rates of grant from October 1, 1931, which have already been mentioned.

Grants totalling £2,147 were also paid during 1931-32 to county borough authorities in aid of their small schemes of agricultural and horticultural education, and £521 to the

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London County Council in respect of their successful evening classes in horticulture, bee-keeping and poultry-keeping, etc. The sum of £2,147 includes a grant of £261 paid to the Liverpool Corporation in aid of expenditure on an experimental course of agricultural training for unemployed youths conducted at the Corporation's hostel, which was previously used for training boys for work overseas.

(ii) *Capital Expenditure*.—A sum of £3,426 was paid during the year in question to five county authorities in England and Wales in aid of capital expenditure on the provision of farm institute buildings, alterations and adaptations, and the provision of a water supply. The two main items under this head were:—

- (1) £1,468 paid to the Hampshire County Council, making a total grant of about £2,000 in aid of expenditure amounting to some £2,700 on alterations and additions to the Sparsholt Farm Institute; and
- (2) £1,350 paid to the Monmouthshire County Council, representing the first grants in aid of expenditure of about £12,500 on the erection of a women's hostel at the Usk Agricultural Institution.

The authorities were contractually committed to these schemes before the financial crisis put a stop to capital developments.

(iii) *Courses of Instruction*.—The table (top of page 733) gives particulars of the courses of instruction, lectures, etc., arranged by local authorities during the past five years. Of the 20,914 students who received instruction in 1931-32, about one-third were women who were mainly taking courses in dairying, poultry-keeping and rural domestic economy.

The year 1931-32 was marked by a considerable extension of organized day courses, the principal form of education available to the adolescent in those counties which do not possess a farm institute. With the exception of courses in manual processes, there was an increase in the number of students who received organized instruction in agricultural subjects.

The sixth annual Livestock Judging Competition, open to teams of students from county farm institutes, was held in June, 1932, at the farm of Mr. Corbett Roper, at Lenborough, near Buckingham, and was won by the team from the Northants Farm Institute at Moulton. These competitions, which are organized by the National Farmers' Union, who present a cup to the winners, are of consider-

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COURSES.

	1927-28	1928-29	1929-30	1930-31	1931-32
Farm Institute, etc., Courses—					
No. of Courses ...	94	87	102	111	133
No. of Students ...	995	950	1,120	1,415	1,618
Organized Day Courses—					
No. of Courses ...	291	323	317	330	462
No. of Students ...	3,244	3,208	3,335	3,766	5,380
Evening Classes—					
No. of Courses ...	337	320	378	424	456
No. of Students ...	7,420	7,204	8,976	9,819	11,514
Correspondence Courses—					
No. of Courses ...	11	11	9	4	7
No. of Students ...	131	145	208	111	114
Instruction in Agricultural Manual Processes*—					
No. of Courses ...	365	398	440	421	265
No. of Students ...	2,964	3,432	3,503	3,795	2,288
Lectures, Demonstrations and Other Meetings—					
No. of meetings ...	9,914	9,564	10,185	11,281	10,617

* Ploughing, hedge-laying, ditching, thatching, sheep-shearing, basket-making, hurdle and spar-making, milking, etc.

able practical value to young people who are studying agriculture.

(iv) *Scholarships*.—During the year under review 1,659 agricultural scholarships were awarded by local authorities, the total cost involved being £24,696. The corresponding figures for the previous year were 1,841 scholarships and £24,144.

(v) *Staff and their Advisory Work*.—With two exceptions, all the counties in England and Wales employ an agricultural organizer, who is generally assisted by a staff of experts in subjects allied to agriculture. The total number of full-time organizers and instructors is 428, and the following list shows the number of each type of instructor employed. In addition, a number of part-time instructors in the various subjects are also employed:—

Agricultural Organizers	...	...	...	...	54 in 57 counties
Agricultural Instructors (in general agriculture, economics, chemistry, biology, mycology, etc.)	112 „ 36 „

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Horticulture	96 in 53 counties
Dairying	66 „ 37 „
Poultry-keeping	65 „ 47 „
Dairying and Poultry-keeping (combined) ..	13 „ 11 „
Farriery	3 „ 3 „
Bee-keeping	4 „ 4 „
Veterinary Science	3 „ 3 „
Farm Accounting	3 „ 3 „
Rural Domestic Economy (Fruit and Vegetable Preservation, etc.)	3 „ 3 „
Manual Processes (hedging, ditching, pruning, grafting, woodwork, etc.)	5 „ 5 „
Agricultural Engineering	1 „ 1 county

In addition to the organized instruction given to students and the management of county farm institutes, experimental stations, demonstration plots and egg-laying trials, where these have been established, the county staffs serve the industry in an advisory capacity, as previously mentioned. The following table indicates the extent of these advisory services by county staffs during the year 1931-32:—

Subject	Visits paid	Inquiries dealt with by	
		Correspondence	Visits to markets, calls at office, telephone, etc.
Agriculture	24,420	28,358	15,598
Horticulture	21,468	21,231	9,725
Dairying	16,388	15,125	5,252
Poultry-keeping	23,492	20,005	12,649
Bee-keeping	5,781	2,845	445
Other subjects	1,249	945	29
	92,798	88,507	43,698

A Conference of Agricultural Organizers was held at Cambridge from June 29 to July 3, 1931. Such conferences are held biennially at either Oxford or Cambridge, and provide an excellent opportunity for the Organizers to meet and discuss subjects of common interest. The theme of the 1931 Conference was "Meat and Milk Production."

A revision course in horticulture for members of county horticultural staffs and others was held in September, 1931, at the University of Reading. A refresher course, enabling county poultry instructors to keep abreast with modern developments in poultry management and research, was

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also held in September, 1931, at the National Institute of Poultry Husbandry at Harper Adams Agricultural College.

C.—Dairying

Owing to the restriction of services brought about by the paramount demands of economy during the year under review, the amount of instructional and advisory work on dairying carried out by the staffs of county councils showed a regrettable decline as compared with the previous year. Fewer clean milk competitions and milkers' competitions were held, the numbers of students under instruction showed a decline, and the advisory visits paid to farms had also to be curtailed. Only in one or two instances, however, were the county dairying staffs reduced in strength; the Council's organizations in general remain intact and should be able to render valuable service in connexion with future developments in the improvement of the country's milk supply.

The experimental scheme for the establishment of county registers of accredited milk producers, which was mentioned in previous reports, is proceeding in seven counties, and gives indications that it may be useful in facilitating bonus payments by the distributive trade for milk of high hygienic quality.

Courses of Instruction.—About 4,800 students were registered as attending courses of instruction in dairying during 1931-32, a decrease of more than a thousand in comparison with the previous year. These courses include farm institute courses, travelling schools in butter- and cheese-making, and classes for milkers. In addition, it is estimated that about 900 students received some instruction in cheese-making at farms visited by the county instructors for short periods (one to three days).

Milkers' Competitions.—During the year 23 local authorities held 87 milkers' competitions. There were 1,304 competitors, of whom 1,101 reached proficiency standard.

Courses for Sanitary Inspectors.—Nine courses were held during the year, and were attended by 150 officers who are in charge of the local administration of the Milk and Dairies Order. This number is slightly greater than that of last year.

Courses for Cowmen.—A course at Plumpton was attended by 11 men. The results were encouraging, and it is to be hoped that this type of course may be extended when financial circumstances permit.

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Clean Milk Competitions.—The following table gives the detailed returns of the clean milk competitions held by local authorities:—

<i>Clean Milk Competitions.</i>	1930-31.	1931-32.
No. of authorities holding competitions ..	37	25
No. of competitors	1,149	689
No. of cows included	28,888	17,787
No. of samples examined	9,736	5,630
No. of samples reaching "designated" standard	6,602	3,973
Total No. of advisory visits	4,208	2,986
No. of producers competing for first time in 1932	414	
No. of producers who have now competed at least once	4,699	

The reduction in the number of clean milk competitions was to some extent counterbalanced by the institution, in ten counties, of a special advisory service for the benefit of milk producers who had gained certificates of merit in previous competitions. Such producers were excluded, on grounds of economy, from participation in the competitions held during the year under review, which were confined to novices.

Dairy Bacteriological Advisory Service.—The work of the dairy bacteriologists (11 in number) stationed at universities and agricultural colleges has continued to be of great value in assisting to improve the standard of milk production throughout the country. The services that they render cannot be properly set out in statistics, but it may be recorded that during the year they made over 30,000 analyses of milk and dairy products.

D.—Poultry and Small Live Stock

The volume of correspondence and the number of requests received by the Ministry for technical advice from prospective poultry farmers during 1931-32 indicated the continuing popularity of poultry farming as an agricultural pursuit, although the average price of British eggs during 1931 showed a still further decline as compared with 1930. In December, 1931, the index figure for the first time fell below the pre-war average; the level for the year, however, was 16 points above the pre-war average. The decline in the price of British fowls in 1931 as compared with the

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previous year was less marked, the falls as registered by the index figures being 20 points for eggs and 5 points for table poultry.

On the other hand, the general level of feeding-stuffs index prices in 1931 was no less than 17 points below the figure for 1911-13, as against only 4 points below during 1930—a drop of 13 points in the year. Thanks largely to the resulting reduction in feeding costs, poultry farmers as a whole still continued to hold their own in 1931-32 despite the lower prices realized for their produce.

Instructional and Advisory Services.—Practically every county authority in England and Wales employs an expert poultry instructor, some counties having two or three such officers. During the year there were 73 instructors engaged in county poultry work, of which number 10 dealt also with dairying. It is interesting to note that 19 of these instructors were holders of the N.D.P.

The National Poultry Institute Scheme.—Although the total number of students at the National Institute of Poultry Husbandry, Newport, Shropshire, was 37 in 1931-32 as compared with 42 (a record number) in the previous year, the number of second-year or advanced students increased from 1 to 8. As the primary object of the Institute is to provide higher instruction in poultry husbandry, the increase in the number of advanced students is very satisfactory.

The demand for students trained at the Institute also remained strong, and there is every indication that the majority of the trained students find useful occupation after leaving the Institute.

The experimental work conducted under the National Poultry Institute Scheme during the year dealt with the following lines of investigation:—

(a) *At the National Institute of Poultry Husbandry.*—Alternative rations for egg production; management problems of certain types of houses, electric lighting for winter egg production, etc.; problems connected with the production of table poultry; and a certain amount of work in the production of ducks, geese, turkeys and rabbits. Bulletins and leaflets on various aspects of these activities were prepared and published.

(b) *At the Ministry's Veterinary Laboratory at Weybridge.*—Problems connected with fowl paralysis, avian tuberculosis, coccidiosis and syngamiasis. The value of fowl pox vaccine—of which mention was made in the 1930-31 Report—is now firmly established, and increasing numbers of owners of poultry are making a practice of vaccinating young stock as a precautionary measure against the possible introduction of the disease. There is also a growing demand

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for fowl typhoid vaccine, the protective value of which has been favourably reported upon.

(c) *At the School of Agriculture, Cambridge.*—Digestibility of the commoner poultry feeding-stuffs; work was also continued on the effect produced by feeding fatty materials, etc., on the quality of both eggs and carcass. An investigation into the cause of watery whites of eggs was commenced.

(d) *The Research Work in Poultry Breeding at Cambridge.*—Continued investigations into the inheritance of fecundity, the possibility of making a "Silver" Cambar breed and a new breed of ducks that can be used with the drake of either the Fawn Runner or the Khaki Campbell to give a sex-linked result, were the main branches of work with which this station was concerned.

(e) *The Northern Breeding Station, Reaseheath.*—A new series of experiments on in-breeding for egg production has been commenced, and an endeavour is being made to produce a strain of poultry capable of withstanding continuous in-breeding. Other projects are also under consideration.

(f) *The Southern Table Poultry Experiments at Wye.*—The principal work at this station during the year under review was devoted to the possibility of using a cheaper ration for fattening than that generally used in the industry. The results obtained show that the birds fed on the cheaper ration compared satisfactorily with those fed on the ordinary ration. Subsidiary experiments carried out during the year showed that the inclusion of fat in the ration used for cramming was amply justified by the additional weight put on by the chickens.

County Egg-Laying Trials.—During 1931-32, 38 trials were conducted under the Ministry's scheme as compared with 30 in the previous year, and the number of birds entered was 8,505 as compared with 6,450. The average egg production per bird in the trials showed a slight decrease, an average of 181.23 eggs per bird (during a period of 48 weeks) as against 182.33 during the same period in the previous year. This is accounted for by an increase in the number of casualties.

The Gold Challenge Cup presented by the Millers' Mutual Association for competition among counties conducting egg-laying trials under the Ministry's scheme was won in respect of the 1930-31 season by Somersetshire, and for the 1931-32 season by Lincolnshire (Lindsey).

Cockerel-Breeding Scheme.—This scheme, which has been described in earlier Reports, was operated during 1931-32 in eight counties, viz., Cornwall, Dorset, Devon, Hampshire, Wiltshire, Cambridge, Bedford and Essex. Information regarding sales is only available in respect of five of these counties, in which 137 White Leghorn, 61 Rhode Island Red, 50 White Wyandotte and 14 Light Sussex cockerels were disposed of by auction.

Accredited Poultry-Breeding Stations.—Eighteen counties were operating this scheme on an experimental basis during

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1931-32, using the Ministry's model regulations with certain modifications mainly concerned with the testing of stock against disease.

Stud Goat Scheme.—This scheme, which has for its object the improvement of milch goats kept by smallholders, cottagers and persons of similar standing, is administered by the British Goat Society, to which body the Ministry refunds the amount paid in respect of premiums for approved services and makes a grant towards the cost of administration, travelling, etc. During 1931-32, 107 centres were approved under the Scheme, and 1,798 services were approved for premiums.

E.—Miscellaneous

(1) *Scholarships for the Sons and Daughters of Agricultural Workmen and Others.*—Awards under this scheme are confined to (a) sons or daughters of agricultural workmen or of working bailiffs and smallholders whose means are comparable with those of agricultural workmen; (b) sons or daughters of rural workers whose means and method of livelihood are comparable with those of agricultural workmen; and (c) *bona-fide* workers in agriculture. During the 11 years the scheme has been in operation, 1,359 scholarships have been awarded; of these, 65 were for 3- or 4-year degree courses, 93 for 2-year diploma courses, and 1,201 for farm institute courses. The occupations followed by the parents or guardians of the selected candidates were as follows:—

Occupation of parent.	Period.		
	Ten years. 1922-1931.	1932.	Total.
Agricultural workman	325	32	357
Working bailiff	95	11	106
Smallholder	306	32	338
Other rural occupations	205	10	215
Candidates who qualified on their own account as <i>bona fide</i> workers in agriculture	315	28	343
Total	1,246	113	1,359

Scholars who have completed their courses number 959, and comparatively few of these have drifted away from agricultural occupations. The latest information may be summarized as follows:—

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Administrative, teaching, research or official appointments ..	74
Veterinary surgeons	2
Agricultural posts of a supervisory nature	189
Engaged in practical agricultural occupations	491
Working on own account	25
Died	4
Obtained employment outside the agricultural industry ..	43
Seeking employment at date of inquiry	27
Cannot be traced	86
Women who have married	18
Total	959

It should be explained that, of the 86 ex-students who cannot now be traced, the majority have been and probably still are, engaged in agricultural employment, but touch with them has been lost owing to their movement from farm to farm.

(2) *Young Farmers' Clubs*.—This movement continued to make very satisfactory progress during the year and there was a considerable increase in the number of clubs in operation. The International Dairy Cattle Judging Competition for the *Daily Mail* Gold Challenge Cup was held at the Royal Agricultural Show, and there was a record entry for the Annual National Dairy Cattle Judging Competition for the *Farmer and Stockbreeder* Silver Challenge Cup which was held at the Dairy Show in London in October. A poultry judging competition at the Dairy Show attracted an entry of 8 teams.

(3) *Sugar-Beet*.—As in previous years a programme of education and research in sugar-beet cultivation was carried out under the auspices of the Ministry with the aid of funds supplied by the factories. Under the programme provision was made for (i) a prize scheme for growers and their agricultural workers, (ii) the organization of demonstrations, and (iii) the carrying out of experiments on various problems associated with sugar-beet cultivation and the use of factory by-products. The cash prizes awarded under the prize scheme were presented to the successful growers by the Parliamentary Secretary to the Ministry, Earl De La Warr, on April 28, 1932, at the Hotel Victoria, on the occasion of the Annual Luncheon of the British Sugar-Beet Society.

A NEW DUTCH BREED OF TABLE-FOWL

P. A. FRANCIS, O.B.E.,

Poultry Commissioner, Ministry of Agriculture.

UNTIL recent years the poultry industry in Holland was mainly devoted to egg production, and the large brown eggs laid by the Barneveld and Welsummer breeds were the chief speciality of the Dutch poultry-keeper. Some 10 or 15 years ago, however, a new type of fowl with distinctive qualities for table purposes was beginning to appear in North Holland. This type of bird, which is known as the North Holland Blue (Noord Hollandsche Blauwe) is now widely kept for the production of table chickens all over North Holland, and especially in the Beemster district around Puremerend. It has also spread to South Holland, around Barneveld, and to other areas.

Some indication of the influence of this breed upon table poultry production in Holland may be gathered from the fact that whilst in 1921 our imports of table chickens from that country were 4,276 cwt., by 1931 they had increased to 49,729 cwt. Since England's departure from the Gold Standard at the end of 1931 and the imposition of tariffs in the spring of 1932, however, our imports from Holland during 1932 had fallen to 25,108 cwt. For the first 7 months of this year they still amounted to 9,109 cwt. In addition to exports to England considerable quantities are sent to Germany, France, Belgium, and even to Spain.

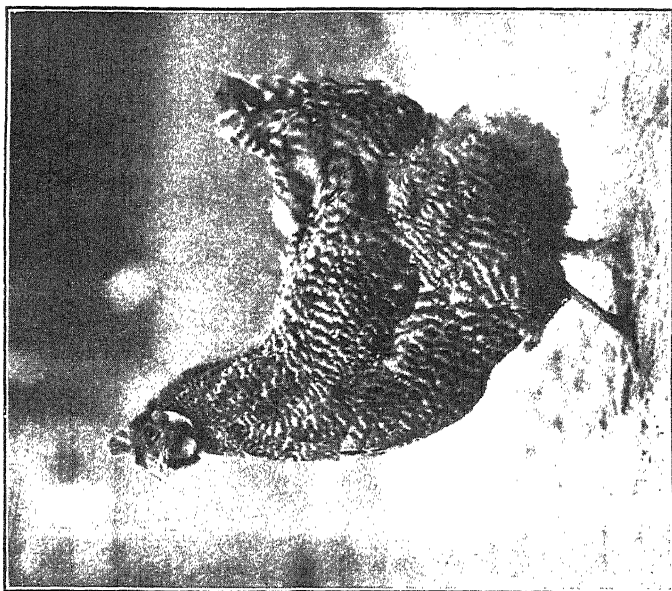
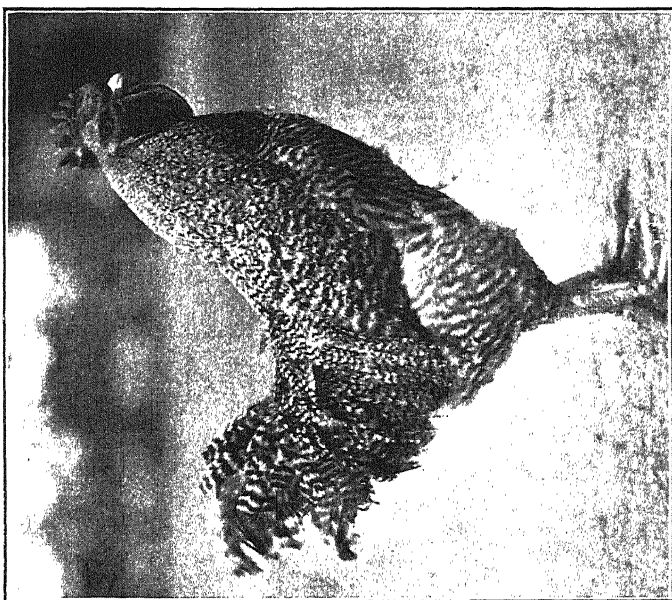
The North Holland Blue breed has formed the basis upon which this development in the Netherlands has taken place, in much the same way that the dark-brown eggs of the Barneveld and Welsummer breeds laid the foundation of the export of Dutch eggs to this country. The North Holland Blue has been built up from the Coucou de Malines and various crosses of this breed with Barred Rocks, Orpingtons and possibly also with Rhode Island Reds and Sussex. The result is a bird with feather colouring similar to the Coucou de Malines (but usually without feathered legs), with white flesh and white legs, and of a type approximating to that of the Barred Rock. The present standard for the breed prescribes a minimum weight of 8.8 lb. for

NEW DUTCH BREED OF TABLE-FOWL

the adult male and 5.5 lb. for the female. It also demands a broad and very fleshy breast in both male and female.

The breed appears to produce chickens that grow rapidly, reaching a weight of some $3\frac{1}{2}$ lb. at about 13 weeks old and carrying a good proportion of breast meat without being "leggy" in type. The flesh is soft and white and the birds seem to fatten easily. They are usually trough-fed for a period of about two weeks before killing, and the fattening ration includes maize, barley, wheat, buckwheat, and rice meal, as well as some buttermilk. Fattening is sometimes carried out by the producers themselves, but also at special fattening centres of greater capacity. Plucking and stubbing are done by hand, mostly by men, and the birds are chilled before despatch. There is nothing new or secret in the technique adopted for fattening or in the preparation for market. The birds are packed in non-returnable boxes that usually hold a dozen each.

It is difficult to say whether the moist climate and the damp soil in Holland have any influence upon the character of the chickens produced. So far the North Holland Blue does not seem to have been tested in other countries where climate and soil are different. The birds are mostly reared by small producers who appear to pay high prices for their land. Ordinary methods of rearing are adopted and hatching begins about October. It is of interest to note, however, that the breeding stock consists almost invariably of pullets and cockerels hatched in the early part of the same year. The pullets are stated to produce fair-sized and hatchable eggs when about six months old and the practice of breeding year after year from such young stock does not seem to have affected injuriously the size or vigour of the breed. Cockerels and pullets are sometimes separated when distinguishable, but are often reared together, and when the chickens are about 12 to 14 weeks old they are put up for fattening by the producer (who sometimes exports direct) or are sent for sale to a local market where they are sold either by private treaty or by public auction to dealers or fatteners. Large quantities of these birds are now bought for export to Belgium, where they are afterwards fattened. In June last in Puremerend good chickens of this breed weighing about $3\frac{1}{2}$ lb. live weight were sold at approximately 65 cents per kilo (1 florin = 100 cents, 1 kilo = 2.2 lb.). At the rate of exchange then current this price was equivalent to a little over 8d. per lb. The finished



Typical Cock and Hen of the new North Holland Blue breed of table-fowl.

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NEW DUTCH BREED OF TABLE-FOWL

birds were at that time being exported mainly to Germany and to countries other than England.

In English markets Dutch chickens have become well known, and until recently have met with a ready sale. They reach this country mainly during the autumn and winter, though sometimes in past years supplies have arrived during most months of the year. The prices obtained have been below those for the best Surreys, but higher than those for second quality English. The Dutch bird supplies a definite demand for a chicken of medium size, soft in flesh, plump, and in good condition. English chickens below the quality and size of good Surreys are too often "leggy," with high breast bones and lacking in condition. They are also too seldom marketed in the graded and standardized form adopted by the Dutch, and thus are not so easily handled in the market for a constant trade. The main demand in this country at the present time is for a bird of medium size (from $2\frac{1}{2}$ up to about 4 lb.), but it is necessary that these birds should be well-finished and carry a high proportion of breast meat.

At the Table Poultry Experiment Station at the South-Eastern Agricultural College, Wye, Kent, special attention is now being directed to the production of this type of bird. It is probably true that the best crammed Surreys that appear on the London market are the finest-quality chickens produced in any country, but in relation to the total consumption of chickens in this country the demand for this type of bird is comparatively small. There seems little doubt that the British producer will be well-advised to devote more attention to the production of well-finished chickens of medium size and plump type for which there is now the greatest demand.

LICENSING OF STALLIONS UNDER THE HORSE BREEDING ACT, 1918

THE number of stallions licensed in England and Wales under the Horse Breeding Act, 1918, showed a further increase in 1933, 1,516 licences being issued against 1,477 in 1932 and 1,432 in 1931. The following table shows the number of stallions licensed in each year since 1927:—

		<i>Service Season.</i>						
		1927	1928	1929	1930	1931	1932	1933
Shires ..	..	772	720	760	752	761	853	888
Other Heavy Horses ..	..	328	313	329	335	342	358	387
Light Horses (including ponies) ..	..	437	381	347	343	329	266	241
		<u>1,537</u>	<u>1,414</u>	<u>1,436</u>	<u>1,430</u>	<u>1,432</u>	<u>1,477</u>	<u>1,516</u>

Heavy stallions were again wholly responsible for the increase in the total number of licences issued, but the decrease in the number of light stallions and ponies was smaller than in 1932. The increase in heavy stallions from 1,211 to 1,275 was shared by each of the three most numerous breeds, Shires increasing from 853 to 888, Clydesdales from 130 to 138 and Suffolks from 136 to 154, while Percherons were unchanged on the year at 57. Although light stallions and ponies decreased from 266 to 241, the number of pony stallions licensed advanced from 51 in 1932 to 61 in 1933. Thoroughbreds decreased from 166 to 134.

Licences were refused in respect of 40 stallions, a decrease of 5 as compared with 1932. Ten appeals against refusals were lodged as against 7 in the previous year, and in 6 cases the appeals were successful. The breeds of the stallions rejected and the reasons for their rejection are given in the table at the top of the opposite page.

Seventeen infringements of the Act were reported to the Ministry during the season, as against 19 in the preceding year. Successful proceedings were taken by the police in six instances where unlicensed stallions had been travelled for service. Most of the other infringements reported were in respect of the travelling or exhibiting for service of licensed stallions unaccompanied by the licences, and in

LICENSING OF STALLIONS

NUMBER OF APPLICATIONS FOR LICENCES NOT GRANTED AND GROUNDS OF REFUSAL, 1933.

Breed	Number refused	Percentage refused	Disease								
			Whistling	Roaring	Stringhalt	Shivering	Sidebone	Cataract	Ringbone	Bone Spavin	Inadequately Prolific
<i>Pedigree</i>											
Shire ...	25	3'1	9	5	1*	2	4	2	1	—	1
Percheron ...	3	5'1	1	2	—	—	—	—	—	—	—
Clydesdale ...	1	0'8	—	—	—	—	—	—	—	—	1
Suffolk ...	2	1'3	—	1†	—	—	—	—	1	—	—
Thoroughbred	2	1'5	2	—	—	—	—	—	—	—	—
<i>Non-Pedigree</i>											
Heavy ...	7	4'1	2	2‡	—	—	1	1†	—	1	—
Totals ...	40	2'6	14	10	1	2	5	3	2	1	2

* Also affected with sidebone, † also affected with ringbone,
‡ also affected with shivering.

these cases the owners and leaders were warned by the Ministry as to the requirements of the Act in this respect.

Stallion owners in possession of licences for the year ended October 31, 1933, are reminded that these licences expired on that date, and should be returned to the Ministry. Applications for licences for the 1934 travelling season may now be made, and it will greatly assist the Ministry to make economical arrangements for the examination of stallions if applications are made as early as possible. Application forms may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

[The Table showing the number of applications for licences, the number granted and the number refused, respectively, appears on the next page.]

LICENSING OF STALLIONS

NUMBER OF APPLICATIONS FOR LICENCES AND NUMBER OF LICENCES GRANTED AND REFUSED RESPECTIVELY in ENGLAND AND WALES, 1933.

BREED OR TYPE	PEDIGREE (i.e. Stallions entered or accepted for entry in the recognized Stud Book of their Breed)			NON-PEDIGREE (i.e. Stallions not entered or accepted for entry in a recognized Stud Book)			TOTALS OF EACH BREED AND TYPE (Pedigree and Non-Pedigree)		
	Applications	Licensed	Refused	Applications	Licensed	Refused	Applications	Licensed	Refused
Heavy									
Shire -	814	789	25	102	99	3	916	888	28
Clydesdale -	122	121	1	17	17	—	139	138	1
Suffolk -	149	147	2	8	7	1	157	154	3
Percheron -	59	56	3	2	1	1	61	57	4
Others -	—	—	—	40	38	2	40	38	2
Light									
Hackney -	17	17	—	5	5	—	22	22	—
Thoroughbred -	133	131	2	3	3	—	136	134	2
Arab -	9	9	—	3	3	—	12	12	—
Cleveland Bay -	4	4	—	—	—	—	4	4	—
Hunter -	2	2	—	1	1	—	3	3	—
Others -	—	—	—	5	5	—	5	5	—
Pony and Cob									
Welsh -	10	10	—	—	—	—	10	10	—
Fell -	3	3	—	—	—	—	3	3	—
Dales -	7	7	—	5	5	—	12	12	—
Polo and Riding -	9	9	—	3	3	—	12	12	—
Shetland -	3	3	—	—	—	—	3	3	—
Welsh Cob -	12	12	—	8	8	—	20	20	—
Others -	—	—	—	1	1	—	1	1	—
TOTALS -	1,353	1,320	33	203	196	7	1,556	1,516	40

MARKETING NOTES

Regulation of Imports of Bacon and Hams.—The September number of this JOURNAL contained (pp. 546-548) a statement of the Government's policy with regard to the regulation of bacon and ham supplies, together with information respecting imports from foreign countries in the period November 23, 1932, to July 22, 1933, under the voluntary arrangements with the principal foreign supplying countries for the limitation of exports to this market. The following statement shows the quantity of bacon and hams imported into the United Kingdom from each such country in the period December, 1931, to September, 1932, inclusive, the total allocations for the period November 23, 1932, to September 14, 1933, inclusive, and the quantity actually imported into the United Kingdom in the latter period:—

Country	Imports into U.K. Dec., 1931, to Sept., 1932		Allocations Nov. 23, 1932, to Sept. 14, 1933		Imports into U.K. Nov. 23, 1932, to Sept. 14, 1933	
	Cwt.		Cwt.		Cwt.	
Denmark ..	6,535,096		4,654,000		4,802,544	
Netherlands ..	614,615		764,400		762,080	
Poland ..	1,101,535		742,800		769,481	
Lithuania ..	412,015		371,700		370,515	
Sweden ..	378,892		351,900		333,089	
Estonia ..	64,020		67,800		52,361	
Finland ..	31,752		40,470		35,743	
Latvia ..	7,778		36,770		35,711	
U.S.S.R. ..	44,001		37,600		36,566	
Argentina ..	72,653		55,600		61,776	
U.S.A. ..	458,040		490,500*		509,123	
Totals ..	9,720,397		7,613,540		7,768,989	

* Subject to price contingent addition in the period June 23 to September 14 not exceeding 25,575 cwt.

Taking into account re-exports of bacon and hams imported from foreign countries in the period November 23, 1932, to September 14, 1933, amounting approximately to 71,000 cwt., the net imports from such countries in that period amounted to 7,698,000 cwt., approximately, thus showing a close correspondence between allocations to and imports from the countries concerned. Further, as compared with imports of bacon and hams from these countries

MARKETING NOTES

in the period December, 1931, to September, 1932; a reduction of nearly 2,000,000 cwt., or 20 per cent., has been effected in the period November 23, 1932, to September 14, 1933.

The marketing schemes for pigs and bacon came into operation on September 10, and henceforth United Kingdom supplies of bacon and hams will be adjusted, as far as possible, to a stable supply figure; after providing for the home output and allowing for Dominion supplies, the balance of the total quantity will be distributed between foreign exporting countries. Allocations of imports to foreign countries on this basis in respect of the current allocation period (September 15, 1933, to February, 28, 1934) represent a reduction of approximately 11 per cent. in the total rate of importation from such countries in the period July 23, to September 14, 1933. These allocations are, however, subject to adjustment on November 1, 1933, according to the volume of home pig-contracts. The closing date of the period within which such contracts could be made was October 12, when the indications were that an unexpectedly large supply had been contracted for, necessitating a further substantial reduction in imports from foreign sources as from November 1.

Milk Marketing Scheme, 1933: Contract Arrangements for 1933-34.—The Milk Marketing Board, which was recently constituted under the Agricultural Marketing Acts, 1931 and 1933, announced on September 28 the terms under which milk is to be bought and sold during the period from October 6, 1933, to March 31, 1934. The Scheme provides for the division of England and Wales into eleven regions. It provides also that a contract price (now known as the "Regional Price") will form the basis of all wholesale transactions between vendors or primary producers and purchasers of milk in each region, so that, in effect, all milk—whether for consumption as liquid or for use in manufacture—will be *purchased* at the same price throughout each region and the proceeds credited to a regional pool. A rebate from the regional contract price, equal in amount to the difference between the contract price and the appropriate manufacturing price, will be allowed to purchasers who use milk for manufacture.

The proportion of the regional contract price returnable to vendors will naturally depend on the amount remaining

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in the pool, after deducting rebates for manufactured milk and regional levies, and any adjustment that might be made from the inter-regional compensation fund. The premiums for level delivery, special services and production of milk of a special quality are payable to the vendor in addition to the pool price.

Regional Contract Prices.—Under the terms now announced by the Milk Marketing Board, the regional prices per gallon in the South-Eastern region (comprising the administrative counties of East Sussex, Essex, Hertford, Kent, London, Middlesex, Surrey and West Sussex and the county boroughs of Brighton, Canterbury, Croydon, Eastbourne, East Ham, Hastings, Southend-on-Sea and West Ham) for the next six months will be 16d. in October and November, 17d. in December and January, 16d. in February, and 14d. in March. In the other ten regions, the prices will be 15d. in October, 16d. in November, December, January and February, and 14d. in March. When milk produced in any region is consumed in another, the price to be paid is the higher regional price.

Manufactured Milk.—Purchasers who can satisfy the Board that the milk purchased at the regional price has been utilized in manufacture will be entitled to a rebate equivalent to the difference between the regional prices, indicated in the preceding paragraph, and the appropriate "Manufacturing Prices" which are set out below, namely:—

<i>Milk manufactured into</i>	<i>Price per gallon.</i>
Butter and cheese	A sum equal to the average price per lb. for the previous month of finest white Canadian and finest white New Zealand cheese, less a sum of 1½d.
Condensed milk	6d.
Condensed milk for export	A similar price to that prescribed for manufacture into butter and cheese.
Milk powder	6d.
Fresh cream	9d.
Tinned cream	6d.
Chocolate	8d.
Other milk products	9d.

The rebate is, however, subject to a reduction on account of any sums that have been deducted by the purchaser for rail or road charges and transit risks in respect of milk delivered to a depot.

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Types of Contract.—The conditions of sale allow three types of contract, namely:—

- (a) for sale of the whole of the output of the vendor;
- (b) for delivery of a stated daily quantity (to be known as the “contract daily quantity”) with an allowance of 10 per cent. variation each way from the stated amount;
- (c) for delivery of a stated daily quantity with an allowance of 5 per cent. variation each way.

For contracts of type (b) an additional price (known as the “level delivery premium”) of $\frac{1}{2}d.$ per gallon will be payable above the regional price, and for type (c) the additional price will be $1d.$ per gallon. If, however, any day's delivery falls below the limit of variation, the vendor will lose the premium in respect of the whole of the day's delivery, and if for 14 successive days the deliveries are less than 75 per cent. of the contract daily quantity, the purchaser, after due notice, may determine the contract. Extra premiums for special services will also be allowed above the regional price in all three types of contract.

Contract Forms.—Two forms of contract have been drawn up by the Board for use between purchasers and vendors, and these provide that the Board shall be a party to every contract. One form of contract (L.C. 33/1) is for use in cases where the purchaser has no manufacturing facilities, and the other (M.C. 33/2) for cases where the purchaser has approved facilities. The latter form of contract makes no provision for sales on a level quantity basis. Both forms, however, arrange for a distinction between direct delivery of milk to a distributor and delivery to a depot. The alternative methods of collection and delivery are clearly set out in the contracts, but in each instance the cost of delivery from farm to distributor or depot is made a charge upon the vendor. Where delivery is made to a depot, the purchaser is entitled to deduct from the purchase price a sum of $\frac{1}{2}d.$ per gallon for transit risks.

Accounting Arrangements.—Payments under the contract will not be made direct between purchaser and vendor but through the agency of the Board. A monthly return (or invoice) of the milk delivered by the vendor and accepted by the purchaser is to be completed on the last day of each month and posted to the Board by the vendor not later than the seventh day of the following month. The purchaser will then be advised by the Board of the amount

MARKETING NOTES

due from him, payment of which is to be made to the Board. Payment to the vendor will be made monthly as soon as the "Regional Pool Price" has been calculated. The net amount payable to the vendor will be regulated by the amount realized by the sale of the milk in his region, having regard to the quantity sold for liquid purposes, the quantity sold for manufacturing purposes, and the adjustment due to levies, premiums and inter-regional compensation provided for under the scheme.

It should be noted that the premiums for level delivery ($\frac{1}{2}$ d. per gallon on the 10 per cent. variation and 1d. per gallon on the 5 per cent. variation) or special services, which are additional to the regional prices, will be credited directly to the account of the producer.

Semi-wholesale Sales of Milk.—The Board point out that, in regard to so-called semi-wholesale sales, it is a question of fact in each case as to whether such sales are in reality sales by retail or by wholesale. They have announced that they do not intend to prescribe any fixed price in relation to these semi-wholesale sales. If the transaction is a wholesale one, the price charged must not be less than the wholesale price of liquid milk for the region concerned. If the transaction is a retail one, the sales must be included by producer-retailers making such sales in the form of return provided by the Board.

The Board hope shortly to issue a special form of contract for use in connexion with sales to institutions.

Retail Prices.—The settlement of retail prices has not been undertaken by the Milk Marketing Board, but the contracts drawn up by the Board make it a condition of sale that the purchaser, or any sub-purchaser, shall not sell milk at a sum less than the prevailing retail price in the district in which the milk is sold by retail. The fixing of retail prices, as in previous years, has been left to the discretion of distributors, and, as far as the South-Eastern region is concerned, it is understood that sales under the control of the Amalgamated Master Dairymen, Ltd., will be made at 7d. per quart from October 1 until further notice.

Comparison with Previous Contract Terms.—Although the terms announced for the six months October, 1933, to March, 1934, embody very similar types of contract to those in use in previous years, and the regional contract prices to

MARKETING NOTES

be paid by purchasers approximate closely to those approved in the national agreement in the corresponding period of 1932-33, the scheme now in force involves a radical departure in the method of calculating the payments returnable to vendors.

The main difference is that whereas under the old form of contract the net return to the individual vendor in the majority of cases depended largely on the amount of milk for which he received the "manufacturing price," the return he will receive in the future is the regional pool price for every gallon of milk he sells. This price is determined by the type of production and utilization of milk in each region, as adjusted to some extent by the system of inter-regional compensation from a central fund administered by the Milk Marketing Board.

Milk Marketing Scheme: *Position of the Producer-Retailer.*—The Milk Marketing Scheme provides that no registered producer shall sell milk by retail except under and in accordance with the terms of a retail licence issued by the Board authorizing him to sell milk by retail (para. 62 (1) of the Scheme). The Board, however, is not entitled to refuse to issue a retail licence to any registered producer who makes application therefor unless the applicant be a registered producer who has previously held a retail licence which has been revoked by the Board (para. 62 (3)). The retail licence shall be valid for such period as is specified in the licence; it may contain such conditions as the Board think fit as to the price at, below or above which, and the terms upon which milk may be sold by retail; and it may be revoked by the Board upon breach of any of these conditions by the licensed retailer (para. 62 (2)). Any registered producer who sells milk by retail without being in possession of a retail licence renders himself liable to such monetary penalties (not exceeding £100) as the Board may impose (para. 62 (4) (a)). Any licensed retailer who sells milk by retail in contravention of the conditions of his retail licence renders himself liable to have his licence revoked in addition to such monetary penalties, again not exceeding £100, as the Board may impose (para. 62 (4) (b)).

The licence to sell milk by retail adopted by the Board in pursuance of para. 62 of the Scheme is valid for the

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period commencing on October 6, 1933, and terminating on September 30, 1934. It states the terms on which the licensed retailer may sell by retail and quotes para. 65 of the Scheme which deals with the contributions by licensed retailers to the funds of the Board. The main condition prescribed is that the licensed retailer shall not sell milk by retail at any sum per gallon (and proportionately for any other quantity) less than such retail price as may be the prevailing retail price in the district in which the milk is so sold by retail. Any discount, dividend, rebate or gift made by the licensed retailer to, or for the benefit of, his customer will be deemed to be a reduction in the retail price. A proviso is added, however, to the effect that a registered co-operative society may return dividends on retail sales of milk where the dividend is paid not oftener than once in every three months, and that any licensed retailer may allow to his customers dividends or discounts on retail sales of milk not oftener than once in three months and not exceeding the rate per pound actually paid on retail sales of milk by any co-operative society operating in the district.

The financial provisions detailed on the retail licence are extracted, without amplification, from para. 65 of the scheme. They relate to the contributions which licensed retailers shall make to the regional pool, and the premiums to which they are entitled. Of these contributions and premiums one class may be dismissed for the time being, namely, the Guaranteed Quality Levy and the Guaranteed Quality Premium for Accredited Producers, as this section of the Scheme has not yet been put into operation.

Apart from the above, the levies payable by the producer-retailer in respect of each gallon of milk which he has produced and sold by retail, are—

(a) the Inter-Regional Compensation Levy which is payable in the region in respect of all sales of milk for liquid consumption;

(b) a sum equal to three-fourths of the difference between the prescribed price, not being a price prescribed for a special grade, for the sale of milk for liquid consumption in his region (less the Inter-Regional Levy) and the Pool Price of his region. For example, if the liquid milk price for the region were 1s. 4d., the Inter-Regional Levy 1d., and the regional pool price 1s. 1d., the producer-retailer would contribute (a) 1d. towards

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Inter-Regional Compensation in the same way as other milk producers whose milk was sold for liquid consumption, and (b) three-quarters of the difference between 1s. 4d. less 1d., and 1s. 1d., i.e., three-quarters of 2d. or 1½d. The producer-retailer who has sold no milk by wholesale except on contracts carrying Level Delivery Premiums will be entitled to receive such sum per gallon as the Board may consider to be the average Level Delivery Premium prevailing in the district in which his milk is produced. The Level Delivery Premium prescribed in the wholesale contracts is ½d. for a 10 per cent. variation either way and 1d. for a 5 per cent. variation either way.

For the purposes of assessment the producer-retailer will submit a monthly return to the Board showing (i) the amount of milk of his own production sold by retail during the calendar month, (ii) the amount of milk sold by wholesale during the month and whether this was sold under a Level Delivery Contract of 5 per cent. variation either way, (iii) the number of cows kept for milking purposes on the last day of the month, (iv) the total quantity of milk produced on his farm during the month, and (v) whether he had bought any milk from other producers. While presumably most producer-retailers will be assessed on the basis of this return, provision is made in the scheme by which the Board, if unable to obtain from any licensed retailer a sufficient return showing the number of gallons sold by him in any accounting period, may treat him as having sold, on each day in that period in respect of each milch cow which he had in his possession on that day, such number of gallons as the Board think proper in the circumstances (para. 65 (4)).

Where a licensed retailer has not had at any time during the period of the validity of his licence more than four milch cows in his possession, his contribution, instead of being based on the quantity of milk sold, will be such sum, not exceeding £2 per annum, as the Board may prescribe.

The Board have now determined by Resolution that such producer-retailers shall contribute to the Board the sum of 10s. per cow per annum (not, of course, exceeding four), calculated according to the greatest number of milch cows which are at any time in the possession of the producer-

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retailer during the period of validity of his licence. Contributions due from licensed retailers will be debts due to the Board, and in the event of default the Board may, in addition to, or in substitution for, any other remedy, suspend the producer-retailer's licence until the debt is paid. By a determination of the Board it has been decided that farmers who sell by retail not more than a gallon of milk daily need not obtain retail licences.

Sales of Certified and Grade A (T.T.) Milk.—The Board have by Resolution exempted from the provisions of Part VI of the Scheme all sales by registered producers of Certified Milk sold as such and all sales of Grade A (T.T.) milk sold as such. If Certified or Grade A (T.T.) milk is not, in fact, sold under these designations, it will be subject to the provisions of the Scheme.

Sales of Separated Milk.—The Board have by Resolution exempted from the provisions of Part VI of the Scheme all sales by registered producers of separated milk.

Reorganization Commissions for Eggs and Poultry.—*I. England and Wales.*—The Minister of Agriculture and Fisheries has constituted an Agricultural Marketing Reorganization Commission for Eggs and Poultry. The duty of the Commission will be to prepare, in accordance with the provisions of the Agricultural Marketing Acts, 1931 and 1933, a scheme or schemes applicable in England and Wales, for regulating the marketing of eggs and poultry.

The composition of the Commission is as follows:—The Right Hon. Christopher Addison, M.D. (*Chairman*), F. N. Blundell, Esq., D.L., J.P., A. F. Forbes, Esq., C.A., Mrs. Lindsey Huxley, and Simon Marks, Esq. The Secretary of the Commission is Mr. H. J. Johns, M.B.E., and the Assistant Secretary, Mr. W. C. Tame, both of the Ministry of Agriculture and Fisheries.

Communications for the Commission should be addressed to the Secretary at 3, Sanctuary Buildings, Great Smith Street, Westminster, London, S.W.1.

II. Scotland.—The Secretary of State for Scotland has constituted an Agricultural Marketing Reorganization Commission for Eggs and Poultry. The duty of this Commission will be to prepare in accordance with the provisions of the Agricultural Marketing Acts, 1931 and 1933, a scheme

MARKETING NOTES

or schemes applicable in Scotland for regulating the marketing of eggs and poultry.

The composition of this Commission is as follows:—Major Mark Sprot (*Chairman*), H. H. Corner, Esq., Major John Gould Kennedy, M.C., W. K. Leggat, Esq., and James Prentice, Esq.

III. *Great Britain*.—The Minister of Agriculture and Fisheries and the Secretary of State for Scotland propose to appoint, from the personnel of the English and Scottish Commissions, a Reorganization Commission for Great Britain whose duty it will be to investigate and report on the manner in which the operation of schemes prepared as aforesaid for regulating the marketing of eggs and poultry in England and Wales and in Scotland could be facilitated by—

- (i) co-operation between the Boards administering them and between them and any corresponding body in Northern Ireland; and
- (ii) the regulation of imports of eggs and poultry and other poultry products as provided for in the Agricultural Marketing Act, 1933.

Dr. Addison will be the Chairman of the Great Britain Commission.

National Mark Beef.—The number of sides (including quarters and pieces expressed in terms of sides) of beef graded and marked with the National Mark during July, August and September, 1932 and 1933, and the three weeks ended October 21, 1933, were as follows:—

<i>Period.</i>	LONDON AREA.			<i>Total London Supplies.</i>
	<i>London.</i>	<i>Birkenhead.</i>	<i>Scotland.*</i>	
July, 1932 ..	4,487	915	3,766	9,168
„ 1933 ..	5,292	1,420	4,223	10,935
Aug., 1932 ..	5,682	828	4,165	10,675
„ 1933 ..	5,065	2,132	4,533	11,730
Sept., 1932 ..	6,531	2,097	4,601	13,229
„ 1933 ..	5,465	3,312	5,114	13,891
Three weeks ended Oct. 21, 1933 ..	4,438	2,970	3,638	11,046

* Figures include Scotch sides graded and marked in London.

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Period.	BIRMINGHAM AND YORKSHIRE AREAS.				Halifax.
	Birmingham.	Leeds.	Bradford.		
July, 1932 ..	3,349	1,322	1,156		270
„ 1933 ..	3,738	1,714	1,566		390
Aug., 1932 ..	3,593	1,596	1,419		299
„ 1933 ..	3,985	1,975	1,349		418
Sept., 1932 ..	4,188	1,725	1,327		368
„ 1933 ..	4,079	2,019	1,497		435
Three weeks ended Oct. 21, 1933 ..	3,400	1,569	1,289		364

The scheme was inaugurated experimentally in the London area on October 4, 1929, and subsequently extended to the Birmingham, Leeds, Bradford and Halifax areas. Within a few days of the completion of the fourth year of the scheme, the number of sides graded and marked exceeded one million. The results show the value attached by traders to a system that provides them with an impartial guarantee of both the origin and the quality of the beef they supply.

The table below shows that approximately one-half of the total number of sides marked were graded *Select* and one-half *Prime*. The small number of sides graded *Good* is explained by the fact that in Scotland the scheme is limited to the *Select* and *Prime* grades, and in England traders are reluctant to submit for marking sides that fall into the *Good* grade.

NUMBER OF SIDES OF HOME-KILLED AND SCOTCH-KILLED BEEF GRADED AND MARKED FROM THE COMMENCEMENT OF THE NATIONAL MARK SCHEME TO SEPTEMBER 30, 1933.

Centre	<i>Select</i>	<i>Prime</i>	<i>Good</i>	Total
London	119,781	214,910	6,355	341,046
Birkenhead	15,180	68,419	1,660	85,259
Scotland	256,296	63,026	—	319,322
London—all sources	391,257	346,355	8,015	745,627
Birmingham	58,046	72,541	7,275	137,862
Leeds	20,476	44,746	1,786	67,008
Bradford	16,384	35,285	1,532	53,201
Halifax	2,715	8,212	1,781	12,708
Yorkshire Total	39,575	88,243	5,099	132,917
Home-killed Total	232,582	444,113	20,389	697,084
Scotch-killed Total	256,296	63,026	—	319,322
GRAND TOTAL (All Centres)	488,878	507,139	20,389	1,016,406

MARKETING NOTES

Grading and marking proceeds smoothly in all centres. The efficiency of the grading is demonstrated by the negligible number of instances in which the grader's decision is questioned.

Consignment of Cattle for Sale by Dead Weight and National Mark Grades.—As a complement to the National Mark Beef Scheme, the scheme for the experimental consignment of cattle for sale on the basis of dead weight and National Mark grades continues to make progress. A total of 439 consignments, involving 3,245 cattle, have been dealt with at the beef grading centres; of these, 99 consignments, involving 727 cattle, were dealt with during the 3 months ended September 30. These latter cattle were received from 22 English and 3 Welsh counties, Lincolnshire sending 150 and Warwickshire 122. Most of the cattle were consigned from the Midlands and West Midlands.

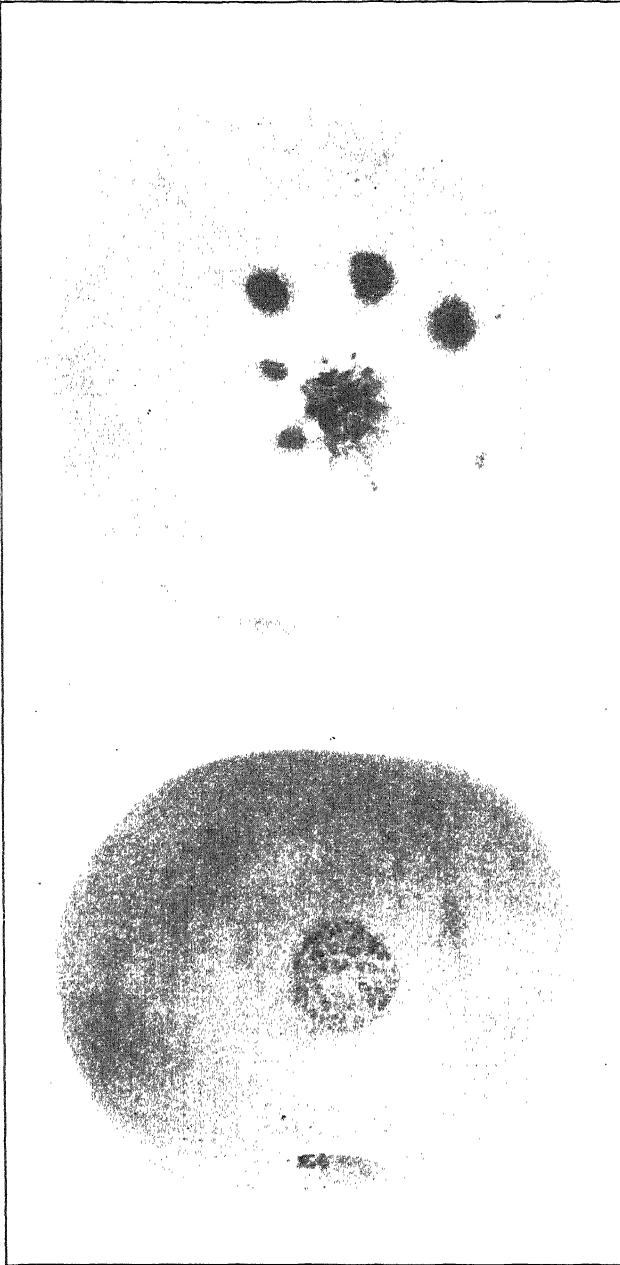
Experimental Schemes for the Sale of Lambs and Ewes by Dead Weight and Grade.—The experiments in the marketing of lambs by dead weight and grade, described in the August issue of this JOURNAL, are being continued. Up to September 30, a total of 8,665 lambs had been dealt with at Manchester and Liverpool and 2,784 lambs at the National Mark meat-grading centres at Birmingham, London and Leeds.

Arrangements were made at the beginning of August for experimental consignments of ewes to be dealt with, two grades of quality being prescribed. The number of ewes marketed under the scheme by September 30, was 1,091, of which 976 were consigned from North Wales and graded at Liverpool.

Proposals for bringing other classes of sheep within the scope of these experimental schemes are under consideration.

National Mark Apples and Pears.—In view of representations that have been received, from time to time, in favour of simplification, the requirements of the standardization schemes for apples and pears have been reviewed, in consultation with the National Mark Fruit Trade Committee, and revised Regulations under the Agricultural Produce (Grading and Marking) Acts have been issued.*

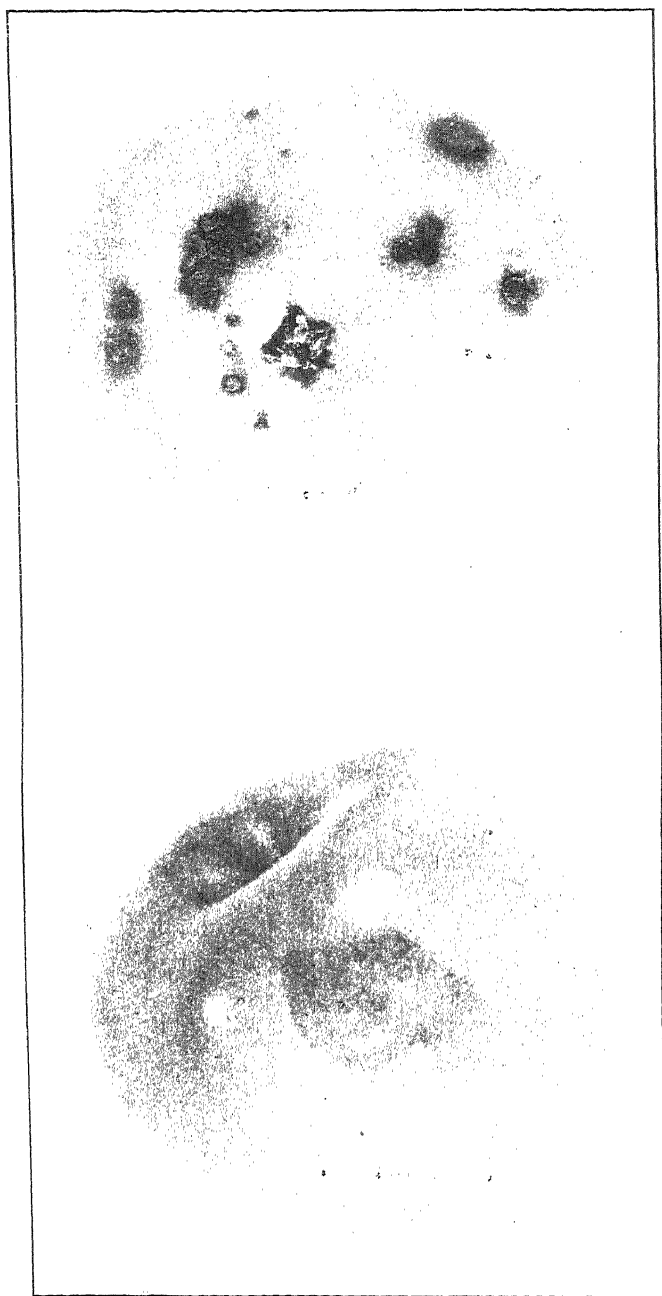
* Apples: Statutory Rules and Orders, 1933, No. 931;
Pears: Statutory Rules and Orders, 1933, No. 932.



Skin Blemish.

Scab Spots.

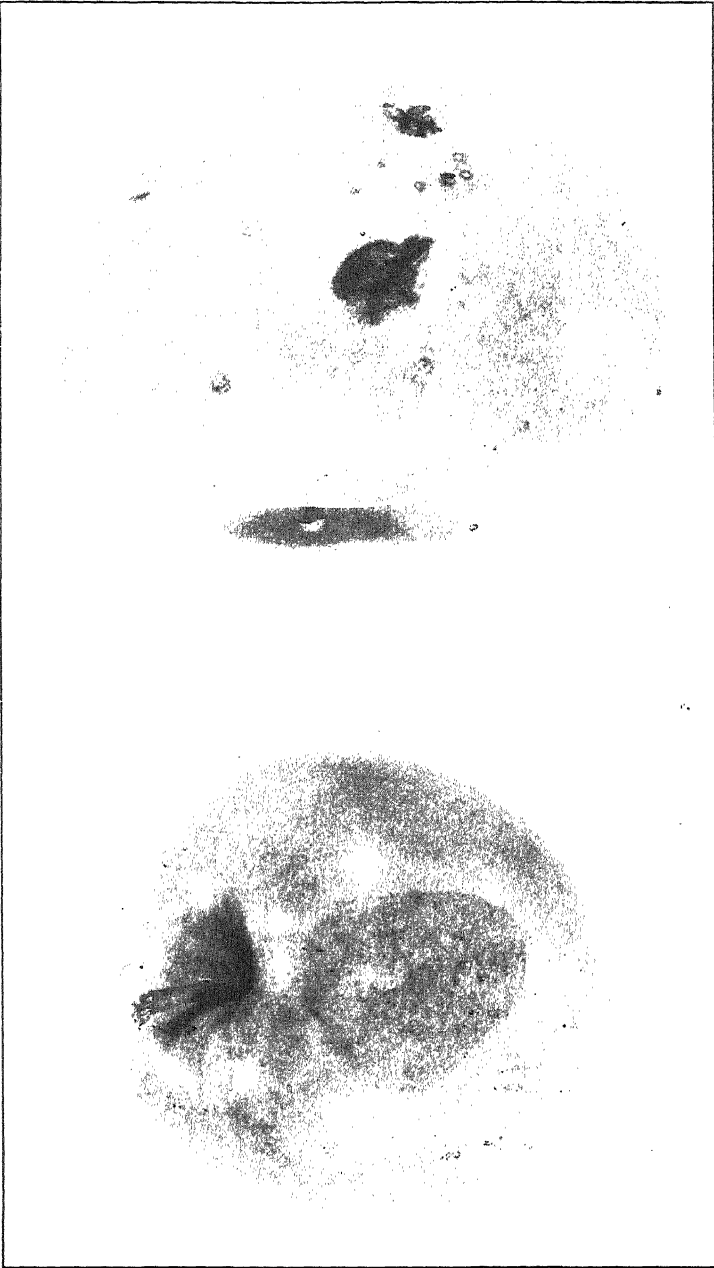
FIG. 1.—Specimen apples of “Fancy” grade, showing practical interpretation of *maximum* blemish allowance. *Extract from Statutory Regulations.*—Each apple shall be free from such blemishes and mechanical injury as may affect keeping quality. The skin blemish on any apple shall not exceed in the aggregate $\frac{1}{4}$ inch square. . . . Russeting in which the skin is so cracked as to affect keeping quality is not permitted on any apple. Ordinary apple scab in which the skin is cracked is not permitted on any apple. Immature scab spots shall be considered blemish.



Skin Blemish.

Scab Spots.

FIG. 2.—Specimen apples of "Domestic" grade, showing practical interpretation of *maximum* blemish allowance.
Extract from Statutory Regulations.—Each apple shall be free from such blemishes and mechanical injuries as may affect keeping quality or may have caused disfigurement. The skin blemish on any apple shall not exceed in the aggregate $\frac{1}{4}$ inch square.



Cracked Scab.

Skin Blemish exceeding $\frac{3}{4}$ inch square.

FIG. 3.—Specimens of apples unfit for packing under the National Mark grades.

MARKETING NOTES

For each fruit, the grade designations, *Extra Fancy* and *Fancy* have been retained, but a new grade designation—*Domestic*—has been substituted for the *C* grade designation, which has proved to be an unpopular description. While the Regulations in each case provide for a *Domestic* grade for both culinary and dessert fruit, the packing of *dessert* apples and pears of this grade under the National Mark will not be permitted.

As an aid to the determination of the areas of blemish permitted in the case of *Fancy* and *Domestic* grades, diagrams illustrating the maximum areas of blemish allowable for apples and pears of these grades are included in the new Regulations.

Illustrations of apples showing the maximum amount of blemish permissible in each of the grades *Fancy* and *Domestic* face page 758. Some specimen apples that are blemished in excess of the tolerance for these grades are also shown.

Home-Grown Plums and Black Currants.—*Analyses of Specimen Packs Received in Covent Garden and Spitalfields Markets, London.*—Following on the investigation into the methods adopted by growers in grading and packing strawberries, as reported in the August, 1933, issue of this JOURNAL, similar investigations as regards plums and black currants were carried out by the Ministry during August, 1933.

Plums.—Thirteen packages of non-National Mark and one of National Mark plums, representative of most of the varieties that may be packed under the Mark, were obtained in Covent Garden and Spitalfields Markets, London. These had been consigned by different growers.

The summary of the results of the analyses on p. 760 shows that, allowing a tolerance of 10 per cent. by count, exactly 50 per cent. of the samples came up to National Mark standards in every respect. This may be regarded as satisfactory, when compared with the results of the investigation into the marketing of strawberries, and would seem to indicate that there is little to prevent the bulk of the plum crop from being packed under the National Mark.

The fruits in four samples, Nos. 11, 12, 13 and 14, were considerably below the minimum weight standards set by the National Mark scheme for "Victoria" and "Monarch," which suggests that the statutory definition

MARKETING NOTES

EXAMINATION OF PLUM PACKS, 1933. SUMMARY OF RESULTS

Sample No.	Price s. d.	Container	Variety	Net Weight lb. oz.	Number of Plums		Total by count below <i>Selected</i> grade per cent.
					<i>Selected</i> grade	Below <i>Selected</i> grade	
1	2 6	Half Sieve	Rivers' Early Prolific	28 0	729	117	13
2	2 6	"	Czar	24 4	393	150	27
3	2 6	"	"	27 3	451	31	6
4	1 0	No. 6 Chip	Purple Pershore	5 8 $\frac{1}{2}$	95	11	10
5	2 0	Box	"	12 4 $\frac{1}{2}$	221	7	3
6	2 9	$\frac{1}{2}$ bush. Apple Box	Pershore Yellow Egg	27 2	453	22	4
*7	1 6	No. 12 Chip	"	12 2	181	17	8
8	4 6	Half Sieve	Belle de Louvain	24 4	130	53	28
9	3 6	No. 12 Chip	"	14 5	94	2	2
10	3 0	"	Victoria	12 0	95	11	10
11	4 0	Half Sieve	"	30 4	87	277	76
12	3 6	"	"	25 8	45	308	87
13	1 6	No. 12 Chip	Monarch	13 14	2	221	99
14	4 0	Half Sieve	"	24 2	99	182	64

* Packed under the National Mark

MARKETING NOTES

EXAMINATION OF BLACK CURRANT PACKS, 1933. SUMMARY OF RESULTS

Sample No.	Price	Container	Net Weight	Berries which complied with requirements of <i>Selected</i> grade for colour, condition and blemish										Berries not in accordance with requirements of <i>Selected</i> grade for colour, condition and blemish
				$\frac{3}{8}$ " in diameter and over	Under $\frac{3}{8}$ " diameter						Total (100%)			
					Over $\frac{5}{16}$ "		Over $\frac{1}{8}$ "		Under $\frac{1}{4}$ "					
					No.	%	No.	%	No.	%		No.	%	
1	2 4	No. 3 chip basket	3 0	765	36	1,032	48	291	13	54	3	2,142	103	
2	4	"	3 2	576	22	1,162	44	627	24	253	10	2,618	630	
3	1 9	"	3 0	643	21	1,408	45	764	25	276	9	3,091	112	
4	2 0	No. 4	4 0	1,243	44	997	35	500	17	120	4	2,860	269	
5	2 6	"	3 12	550	12	1,417	31	1,841	42	645	15	4,453	344	
6	2 6	Not stated	4 0	533	17	2,000	65	472	15	89	3	3,094	260	
7	2 0	No. 4 chip basket	4 1	1,211	37	1,340	40	624	19	122	4	3,297	139	
8	2 4	"	3 13½	673	23	1,013	35	827	28	420	14	2,933	204	

MARKETING NOTES

of the *Selected* grade for these varieties may be rather severe. The net weights of the contents of the non-returnable packages were, however, with one exception, satisfactory. Some growers continue to pack 23 lb. instead of 24 lb. of plums in the returnable half-sieve, and this accounts for the variations in contents.

On the average, the colour of the fruit was reasonably uniform. Samples 11 and 12, however, were very mixed, a large proportion of the plums being hard and green, which may have been due to the growers clearing the trees at one picking instead of picking over on two or three occasions—a necessary precaution with the variety “Czar,” which is apt to ripen irregularly.

No evidence of “topping” was found in any of the samples examined.

Black Currants.—Eight baskets of non-National Mark packs of black currants, reasonably representative of the average run of fruit on offer, were examined. The great majority of the berries complied with the statutory definition of the National Mark *Selected* grade as to colour, condition and blemish. As regards size, in only one container did the number of berries of the minimum diameter of $\frac{3}{8}$ inch approximate to 46 per cent. of the contents, which is the minimum prescribed for the *Selected* grade.

The dry weather experienced in June no doubt substantially affected the size of the berries. The quality, although likewise affected by climatic conditions, was considered to be fair.

“Topping” does not appear to be prevalent with black currants, and no trace of this objectionable practice could be found in any of the samples examined.

National Mark Canners at Canners' Convention, Bristol.—The Seventh Annual Canners' Convention was held at Bristol, from October 31 to November 2, 1933. This Convention, which is held under the auspices of the National Food Canning Council, has long afforded an annual opportunity to canners and others interested to meet and discuss the technical and commercial problems with which the food canning industry is faced.

The competition that the home canning industry has to meet calls for increased attention to the standardization of the product, and the Ministry, with the advice of the

MARKETING NOTES

National Mark Canned Fruit and Vegetables Trade Committee, has formulated suggestions for the improved standardization of canned fruit and vegetables packed under the National Mark. These suggestions relate to—(a) standard weights of fruit in cans, (b) standard syrup grades for fruit, and (c) standard sizes for fruits and peas, and it is intended that they shall be made compulsory under the National Mark Scheme in 1934. Details were published in May, 1933, in order that National Mark canners might have an opportunity of testing the specifications during the 1933 season. As the Convention at Bristol offered a favourable opportunity for a general exchange of views, the Ministry accepted the invitation of the National Food Canning Council to hold a conference of National Mark canners during the proceedings. The conference, under the chairmanship of Sir Stanley Machin, J.P., was accordingly arranged for November 2 (the last day of the Convention), when it was anticipated that all canners operating under the National Mark would be present.

National Mark Cheshire Cheese.—152 farm cheese-makers—members of the Cheshire Cheese Federation—and one manufacturer of factory cheese have been authorized to apply the National Mark to their output of Cheshire cheese that is graded in accordance with the national standards prescribed in the Agricultural Produce (Grading and Marking) (Cheshire Cheese) Regulations, 1933.

The first supplies of this National Mark product were on sale at the Wem Cheese Fair on September 27.

Marketing Demonstrations.—During the week ended September 30, classes in apple grading and packing were held in Herefordshire, where, generally speaking, grading is not yet practised to a very large extent. Four growers in different parts of the county lent their premises and mechanical graders, while Officers of the Ministry and of the Local Education Authority gave tuition to those attending the classes—chiefly employees of fruit growers. Similar classes will be held at Wisbech from November 6 to 9.

Publicity for National Mark Products.—Arrangements have been made to place advertisements of National Mark canned fruit and vegetables, beef and eggs, respectively, for successive periods during the six months commencing on October 1, in trains of the Underground and

MARKETING NOTES

London and North Eastern Railway Companies in the London area.

A National Mark Shopping Week is being held in Oxford during the week commencing November 13. Suitable advertisements are being placed in local newspapers, and special displays of National Mark commodities, particularly canned fruit and vegetables, are being made by the local traders. A shop-window dressing competition and other activities are being arranged.

At the annual Birmingham Cattle and Poultry Show, Bingley Hall, November 25-30, a special class of market-pack table poultry is being included experimentally at the suggestion of the Ministry, which is contributing towards the prize money.

Wheat Act, 1932.—Certificates lodged with the Wheat Commission covering wheat sales from the commencement of the cereal year on August 1 up to and including October 13 indicated sales of 6,180,000 cwt. of millable wheat.

Production of Home-Grown Beet Sugar.—Owing to the forward state of the beet crop, the sugar campaign opened earlier than usual, and about 19,400 tons of beet sugar were manufactured in September. The drought has had its effect on the size of the roots, and it is probable that the yield of beet per acre will be below average, but the sugar-content is expected to be high.

Irish Free State Sugar Manufacturers' Act, 1933.—The Sugar Manufacturers' Act, 1933, which was passed by the Irish Free State Dail in August last, provides for the formation of a company—the Irish Sugar Association, Ltd.—to engage in the manufacture of beet sugar. A single factory has been operating at Carlow under the provisions of the Irish Beet Sugar (Subsidy) Act, 1925, and it is the intention of the Association to purchase this factory and to build three additional factories in time to receive the 1934 crop. If these four factories are insufficient to provide the whole of the sugar required by the Irish Free State—at present approximately 90,000 tons per annum—a further factory will subsequently be erected.

The new Act does not provide for the payment of a direct sugar subsidy but it is understood that the Association will be assisted by an increase in the Customs duty

MARKETING NOTES

which will permit the raising of the sugar price. In addition, it is intended to facilitate economic operation by effecting savings in the manufacturing margin and by reducing the price payable to growers for sugar-beet. The present basic beet price is 39s. per ton and it is proposed partially to offset the reduction in this price by returning to growers, gratis, the pulp and molasses produced from the roots supplied by them.

The Act provides for the capital of the Irish Sugar Association, Ltd., to consist of two million shares of £1 each and gives power to the Minister for Finance to subscribe for shares up to a total nominal value of £500,000. No Government guarantee as to principal or interest is attached to the share capital of the Association, but such a guarantee may be given in respect of debentures up to an amount not exceeding the total paid-up share capital.

For as long as the Minister for Finance holds not less than one-tenth of the share capital, or while any guaranteed debentures are outstanding, or while the Customs duty is higher than the Excise duty on sugar, the Government retains certain powers in connexion with the conduct of the Association. These powers include the right of the Minister for Finance to nominate four of the seven Directors of the Association and to appoint the first Managing Director. It has been announced that Dr. Hinchcliffe, of the Ministry of Agriculture, has been appointed Chairman of the Board and Mr. Hayek, the Manager of the existing Carlow factory, as the first Managing-Director.

NOVEMBER ON THE FARM

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NOVEMBER is apt to be a month of varied weather and duties. Work generally is well advanced this autumn as a result of the early corn harvest, though there still remains a good deal of routine work that could not be tackled earlier on account of the hardness of the ground. As far as arable land is concerned sugar-beet harvest is still in progress. The best date for lifting sugar-beet is probably determined by the absence of other competitive farm work. As a means of keeping horse and manual labour occupied, the beet crop has much to recommend it, added to which the cash returns are particularly welcome. This has been discovered by many farmers during the years of depression.

Mangolds.—Observations of farming practice indicate that mangolds are being lifted later this year. Delay may mean a greater risk of frost damage, though there is always a strong temptation to take every advantage of continued growth during a period of open weather such as has characterized October conditions this year. It is desirable, however, to complete mangold carrying before the middle of November, even though there are examples of later clamping. Questions have been raised as to whether roots are likely to store well during the coming winter. A feature of mangolds that are being lifted this autumn is the large number of split roots—probably the result of dry weather conditions. Keeping qualities are very much dependent upon the state of the roots at the time of lifting, the variety, and the care taken in protecting the clamp from frost injury. Waste can so easily occur with root crops that some care bestowed upon their protection is well worth while. There is little point in stimulating crop outputs by good manuring and cultivation if lack of suitable protection and care at and after lifting is responsible for loss. Tankards have the reputation of keeping better than other varieties, but richness in dry matter is apparently an asset in this respect. One sometimes feels that manurial experiments with root crops like mangolds and turnips should be carried through to the yield extracted from the clamps.

NOVEMBER ON THE FARM.

The management of the root clamp, however, plays an important part in the preservation of the roots. Covering with protective material such as straw and hedge trimmings is essential, but earthing down may also be necessary in exposed districts. As with potato clamps, adequate ventilation should be allowed.

Wheat.—Wheat seedings can be safely continued during the first part of the month. The subsequent rate of germination will depend on the mildness or otherwise of the climate. The date of brairding will also to some extent depend upon the depth of sowing. Thus, shallow seedings appear above ground more quickly than deeper seedings. This may be of importance with late-sown crops, when surface or shallow seedings have in theory every prospect of success. There is the great drawback, however, that bird attack is likely to be more severe with shallow sowing, particularly at this time of year.

Farmyard Manure, and Cultivation.—The remainder of arable operations mainly concern the application of farmyard manure to stubbles and the preparation of land for next year's root crops. There has been a growing tendency within the last two or three years to pay more regard to the value of farmyard manure as an agent of fertility and to the significance of good cultivations in the management of arable land. Too often the tendency has been to assume that artificial fertilizers are a substitute both for muck and proper cultivations. Fortunately, opinions on these points are being rapidly revised, and particularly after the experiences of the past summer when good reserves of organic matter in the soil, coupled with good cultivations, have spoken for themselves.

Live Stock.—Live-stock problems during the month are mainly concerned with feeding under winter conditions. Thus yards are usually full of feeding and young cattle, while feeding sheep will be accustomed to normal root diet. As far as the ewe flock is concerned, there are no outstanding events other than the maintenance of sound feet and the provision of suitable pasture or other food to maintain good health. Winter dipping is sometimes done during the month and it is of interest that the modern dips that incorporate derris powder have achieved considerable

NOVEMBER ON THE FARM

success in maintaining insect-free fleeces throughout the winter. Winter dipping has much to commend it if only for this fact, but there is the additional advantage of the extra protection given by the waterproofed fleece.

The growing importance of pigs is stimulating a return to breeding on the part of many, but it is to be noted that November and December are not usually the best months for farrowings. Newly-born pigs are not happy under cold and wet conditions, a combination of which may be expected at this time of year. On many farms, pigs have to be accommodated in buildings that are far from ideal. Increased warmth can frequently be secured by erecting a low roof of battens of straw over the sleeping quarters. This will not make any difference to floors that are damp and cold, and in these cases a brick flooring superimposed on the original will usually effect a marked improvement in the health of pigs. Wooden platforms have sometimes been employed, but while these are warm, they are far from ideal, since they quickly become foul.

The Drought of 1933.—As mentioned last month, droughts are not a normal experience in British farming practice. It is nevertheless necessary to record impressions and experiences if only for the purpose of dictating future policy and checkmating any undesirable consequences. In general, however, the effects of floods are probably more serious than those of drought. Conditions of drought arise in this country when the rainfall over a prolonged period falls seriously below the normal. It was evident in the spring of this year that land drains were not running as freely as usual. In the absence of regular rainfall during the summer, such an occurrence in itself can prove troublesome. This in fact did happen, for the rainfall deficiency for the six months April to September was just over five inches in the east-Midlands or, in other words, the total was three-fifths of the normal. Associated with this deficiency were abnormally high summer temperatures, drying winds, and an extra two hundred hours of bright sunshine for the six months. These, in combination, created drought conditions and dried out the soil particularly quickly.

In attempting to assess the effects of the drought on winter farming problems, one has to recognize that a rapid recovery has taken place with the recurrence of rain. Over most of the country, gentle rains and a continuance of mild

NOVEMBER ON THE FARM

weather have served to induce rapid growth of grass. The grass land generally has recovered and at the time of writing (mid-October) can almost be likened to spring in the richness of colouring, especially where the land is in good heart. There has also been a considerable germination of grass seeds in the bottom of pastures, from which it is evident that no deterioration in grass land should be experienced in the next grazing year. It will be necessary, however, to exercise reasonable care in the winter management of young pastures so as to avoid undue poaching or treading of the land. Similar remarks apply to land that has been seeded down this year. In some instances germination of grass and clover seeds has only taken place since the end of the drought. There appears to be no reason why these should not now make good progress in view of the satisfactory start that they have made. The efficiency of different species of grasses has been well tested during the drought, and cocksfoot in particular has proved its value..

Live stock in general have not been seriously affected. While grazing cattle have tended to fatten more slowly, it has been evident that the feeding value of the burnt-out pastures has been surprisingly good. The real troubles have set in where the land has been too heavily stocked and where the grazing has been very short in consequence. Short grazing, however, is quite acceptable to horses and sheep, and both these classes have taken no harm. Milk yields have been seriously affected, even where supplementary feeding has been provided, and many herds were on winter diet from the middle of August onwards. The summer has been a particularly healthy one for live stock, but it is suggested that the close grazing of grass land in recent months may give rise to outbreaks of parasitic gastritis in young sheep and cattle.

Some interesting problems were created for arable farmers this autumn. The rapidity with which potato haulms died down encouraged an early start in lifting. The natural desire to push ahead with work, however, received two checks where this crop was concerned. The first was the hard-baked condition of the ground, this making the work of the spinner more difficult and being responsible for much bruising of the tubers. The second was the softness or spongy nature of the tubers. The combination of these factors caused many growers to delay lifting until after the rain came, and it is to be noted that,

NOVEMBER ON THE FARM.

with the increase in soil moisture, the tubers regained their normal firmness. Another feature of interest this year has been the tendency of crops sprayed with dry powder sprays against Blight to lose their haulm colour more quickly than unsprayed or wet-sprayed crops. Disease (Blight) in the tubers is rare this year, but in many areas the dry weather has meant a reduction in the proportion of ware tubers. Seed-size tubers, on the other hand, are very numerous.

The expectation that root crops would be particularly light in weight has been to some extent discounted by the favourable growing conditions during the past month. Fresh growth has occurred in both mangolds and sugar-beet, while kales have made marked progress in a surprisingly short time. It would thus appear that the winter food supplies on the average mixed farm can be viewed in a more rosy light than a month ago. In this respect, we have had a repetition of the experiences of 1929.

The germination of weed seeds and shed corn on stubbles and fallows has been particularly marked during the past month. This is all to the good for cleaner crops next year.

NOTES ON MANURING

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SINCE the notes for October were written, the Agricultural Research Institute, Oxford, has kindly forwarded some interesting data derived from the work of the Advisory Economists in three provinces. The information is summarized approximately in the following table, to which the figures for Hertfordshire are appended:—

District	No. of Farms	Approximate proportion of Farms spending the undermentioned Amounts on Fertilizers per Acre of Farmed Land			
		Nil	Nil and under 4/-	4/- to 10/-	Over 10 -
Herts.	303	$\frac{1}{4}$	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{1}{8}$
Bristol province	122	$\frac{1}{5}$	$\frac{4}{5}$	$\frac{1}{6}$	very few
Leeds province	81	$\frac{1}{20}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{2}{5}$
Seale-Hayne province	84	$\frac{1}{40}$	$\frac{1}{5}$	$\frac{4}{7}$	$\frac{1}{6}$

In using this summary, it should be borne in mind that the figures for Herts are based on a random sample of farms scattered over the county and were obtained by the survey method in 1930: the figures for the three provinces are from costed farms for the year 1927-28. It is difficult to say how far legitimate comparisons may be drawn between the various areas, but it is quite safe to use them as an illustration of how trifling a proportion of the average farmer's expenditure is due to the use of fertilizer other than the home-produced natural dung.

What is the reason for this low expenditure on external supplies of manures? It has been plausibly stated that the low consumption of fertilizers is the result of unfavourable economic conditions, and that the British farmer has been influenced simply by economic motives in deciding the extent to which he would purchase fertilizers. If this were a correct explanation we should expect to find a rapidly-falling consumption of artificial manures in this country during the period of rapidly-falling prices of agricultural

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products: also, since the total arable land has declined very considerably from the pre-war level it would be expected that the nitrogenous fertilizers that are used mainly on arable land would show the biggest fall. Actually, however, the estimated consumption of sulphate of ammonia and nitrate of soda in 1913-14 was 60,000 and 80,000 tons respectively: the 1930-31 figures were 166,000 and 45,000 tons, so that the total consumption of nitrogen, in spite of the failure of nitrate of soda to reach its pre-war level, has greatly increased. Further, in the period 1921-31, there has been no decline in the use of nitrogen while, in 1931-32, the figures for sulphate of ammonia and nitrate of soda were 228,000 and 33,000 respectively, giving a total for nitrogen which nearly reached the peak war-time consumption (1918-19), when approximately three million more acres were under arable cultivation.

Similarly, with superphosphate, which also is mainly used on arable land, the average annual consumption in Great Britain and Ireland during the two years 1913 and 1914 was approximately 490,000 tons, for the three years 1924, 1925 and 1926, 380,000, for the next three, 430,000, and for 1930, 1931 and 1932, 609,000, so that the pre-war level has been far surpassed in recent years.

Even in the case of basic slag (which is a by-product and not a specially manufactured manure), the consumption in 1928-29 and 1929-30 was above the pre-war level, and the big fall in 1930-31 is stated by the Permanent Committee on Basic Slag to be due mainly to depression in the steel trade. "The Ministry understands that distributing firms were in some cases unable to meet demand from farmers."

These figures show that the low consumption of fertilizers in Great Britain at the present time is not to be attributed to the economic crisis: on the contrary they prove that there has actually been an upward trend during the present century in spite of the declining acreage of arable land. It is clear, therefore, that although the position is far from satisfactory it is not without its encouraging aspect.

Other Factors Affecting Crop Production.—In the October notes emphasis was placed on the importance of factors other than manuring in the successful growing of crops. In the authors' view a thorough appreciation of this point is *one* of the essentials for progress from the present position. Though most of these factors—rainfall, drainage,

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soil type, soil reaction, cultivations, diseases, plant population, variety, etc.—have some relation to manuring, the majority can hardly be discussed at length under that heading: drainage and soil reaction, however, can legitimately be considered here.

Drainage.—On land that is suffering from lack of drainage, expenditure on manures, however lavish, cannot be expected to produce good crops: indeed, such expenditure is to be deprecated until the dominant defect has been remedied.

It is generally believed that millions of acres of cultivated land in Great Britain are in need of drainage, and information collected by the Farm Economics Branch of the Department of Agriculture, Cambridge, in the course of surveys of agriculture in the Eastern Counties in 1931 and 1932, gives precision to the popular view. In Report No. 19, it is stated that, for all soils and sizes of farms, 14 per cent. of the total area is estimated to require draining, while only 5 per cent. of the total area has been drained during the past five years. As would be expected, the seriousness of the position varies with type of soil, and there are also marked variations within soil type.

<i>Soil.</i>	<i>Percentage of Total Area Needing drainage.</i>	<i>Drained during past 5 years.</i>
Clays	26	8
Loams	13	4.5
Gravels	3	0.25
Herts. and West Cambs. Clay ..	32.0	5.6
N. Essex Boulder Clay ..	30.5	18.5
Central Suffolk Heavy Loam..	21.8	9.7
S. Essex London Clay..	15.4	2.9

In Report No. 21 this information is amplified by a section on mole drainage summarizing data relating to 75 farms situated in the heavier districts. This information should be of considerable value to anyone who is contemplating draining any of his fields.

Some interesting information has recently been collected for an area in south Hertfordshire and north Middlesex during the course of a grassland competition run jointly by the two counties, the results of which have just been published. Nearly 6,000 acres were inspected twice in the year, field by field, in May-June and in September, with the following results from the point of view of the need for drainage:—

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	<i>Area Inspected.</i> <i>Acres.</i>	<i>Area in need of drainage.</i> <i>Acres.</i>	<i>Per Cent.</i>
N. Middlesex	3,600	2,050	57
S. Herts	2,200	890	40

Incidentally, the problem of drainage has been considerably simplified by the comparatively recent introduction of machinery which, using a tractor for power, is capable of cutting the trenches for pipe laying.

Soil Reaction.—Although no precise information is available, it is extremely probable that next to drainage, no single cause is more seriously limiting crop production—and also rendering uneconomic any increased expenditure on manures—than is soil acidity. Although chalk, marl, limestone and other lime compounds have been used in England for nearly 2,000 years the number of acres now suffering from lime shortage cannot be far below that suffering from lack of drainage.

An excellent account of the modern aspects of the use of lime on the crop side of agriculture is given by W. Morley Davies in the *Journal of the Royal Agricultural Society of England* for 1931. Much of the information given is based on experience in the West Midlands, but it holds good for many parts of England and should be of great value to farmers and agricultural advisers generally.

This is the period of the year when any farmer who has detected any of the typical signs of lime deficiency—failure of the sensitive crops such as lucerne, red clover, carrots, sugar beet, mangolds, barley and mustard, growth of sheep's sorrel or spurrey, bad "capping" or "lashing" of the soil—should get in touch with the County Advisory Staff for accurate tests to be made. On the result of these and of other advice received he can then make plans for the application of chalk or lime.

Though it is usual now for moderate dressings of ground chalk or limestone or ground quicklime to be advised as the most economic way of correcting or guarding against soil acidity, circumstances arise when the old practice of applying dug chalk or limestone from a neighbouring pit, or even from a few feet down in the field itself, is well worth reviving. In such instances, heavy dressings of 10 or 15 tons upwards should be put on so that the field will need no attention for a number of years. Heavy dressings are certainly justified on land that is at all heavy, for it is only

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such treatment that can ensure one of the benefits of liming, namely, greater ease of cultivation.

One of the most extraordinary gaps in our agricultural knowledge is that relating to the actual returns likely to be derived from liming. In the *Journal of the Royal Agricultural Society*, 1931, Dr. E. M. Crowther, in an article on "Present Position of the Use of Fertilizers," remarks that "It would probably not be an exaggeration to say that the number of reasonably good methods proposed for estimating the lime requirements of soils is greater than the number of even moderately good field trials on different amounts of lime made in this country." Mr. Morley Davies gives the result of a Harper Adams experiment on this question. Treatments of 0, 25, 50 and 100 cwt. carbonate of lime per acre of ground were applied in 1928 to an extremely acid Bunter Sandstone soil having an estimated "lime requirement" of 40 cwt. of carbonate. The treatments were repeated four times in a 4 by 4 Latin Square. The yields of the four subsequent crops were:—

Carbonate of lime applied.	1929 Barley. cwt.	1930 Sugar Beet. tons.	1931 Sugar Beet. tons.	1932 Barley. cwt.
0	9'26	4'05	0'61	2'01
25	15'07	9'09	4'62	14'79
50	16'06	10'25	5'24	23'03
100	17'11	10'09	5'70	24'25

In each year a large increase in crop resulted from liming, the biggest effect being produced by the first 25 cwt. Although the extra increases produced by the higher dressings were not statistically significant the variations in growth produced by them were sufficiently great in 1932 to be photographed from the air 2,000 feet up!

The gap in our knowledge is also slightly narrowed by an experiment on the well-known demonstration fields at Tunstall, East Suffolk. Here Mr. A. W. Oldershaw has shown the spectacular results obtained on the light acid soil by the addition of small dressings of chalk, and the initial results of an experiment on modern lines conducted on one of his fields is given in the Rothamsted Report for 1932.

CROP, SUGAR BEET.

Chalk, tons per acre	..	Nil	1	2	3	4	Standard Error
Roots, tons per acre	..	1.82	12.61	14.30	14.27	14.74	.432
Tops, tons per acre	..	1.44	11.79	12.01	13.50	13.32	.557
Sugar, per cent.	..	18.74	18.72	18.84	18.65	18.79	.114

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In the absence of chalk, the crop was a failure, giving less than 2 tons per acre. One ton of chalk raised the crop to 12 tons 12 cwt., an additional ton of chalk brought the yield to 14 tons 6 cwt. There was no increased benefit from the higher dressings. The acidity of the Tunstall soil, though intense in degree, is not great in amount, and is readily corrected by light dressings of chalk. A photograph taken in July, 1933, on one of the Tunstall fields showing the failure of sugar-beet on the unchalked soil is here reproduced.

Another experiment, of a rather different type, is given in the same Report carried out on very acid soil at a farm near St. Albans, Herts, in 1932. The results were:—

TREATMENTS.					
	No Phos- phate	7 cwt. Slag	Equivalent Superphos- phate	Superphos- phate + 3 tons Chalk	Standard Error
	No Chalk	No Chalk	No Chalk		
Sugar-Beet					
Roots, tons					
per acre ..	5.25	6.58	6.68	8.94	.57
Tops, tons					
per acre ..	6.34	7.53	7.67	10.19	.61

Here superphosphate and slag have produced the same increase of about 25 cwt. roots: chalk has produced a further increase of 50 cwt. In this experiment, the fertilizers and chalk were applied only a few days before sowing, but in spite of this the chalk has had a big effect on the crop.

One of the illustrations shows a typical case of sugar-beet failure due to soil acidity in a field adjacent to that in which this trial was carried out; the other two photographs were taken on a different part of the same farm during the winter of 1932. An old chalk pit in a field where clover had failed, owing to acidity, was being used during a slack period to give the soil a heavy dressing of chalk.

In the experiment just quoted, slag and superphosphate have given equivalent crops, and tests showed that neither had affected the reaction of the soil. In the west of England Mr. A. W. Ling has carried out experiments on certain acid soils in which basic slag was far superior to superphosphate and was, indeed, sufficiently effective to produce a satisfactory crop of sugar-beet without the addition of lime. Such conflicting results as these emphasize the need for the farmer to consult his local adviser on this and similar questions.

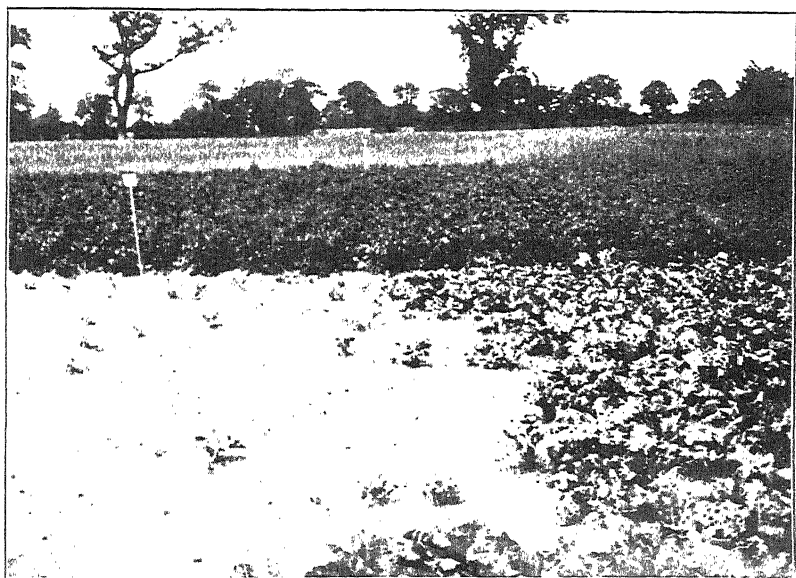


FIG. 1.—Taken, in July, 1933, on one of the experimental fields at Tunstall, East Suffolk. Ground on the right has been chalked; unchalked on the left. Sugar-beet almost completely failed on the acid soil. Potatoes (in the middle distance) flourished on both parts.

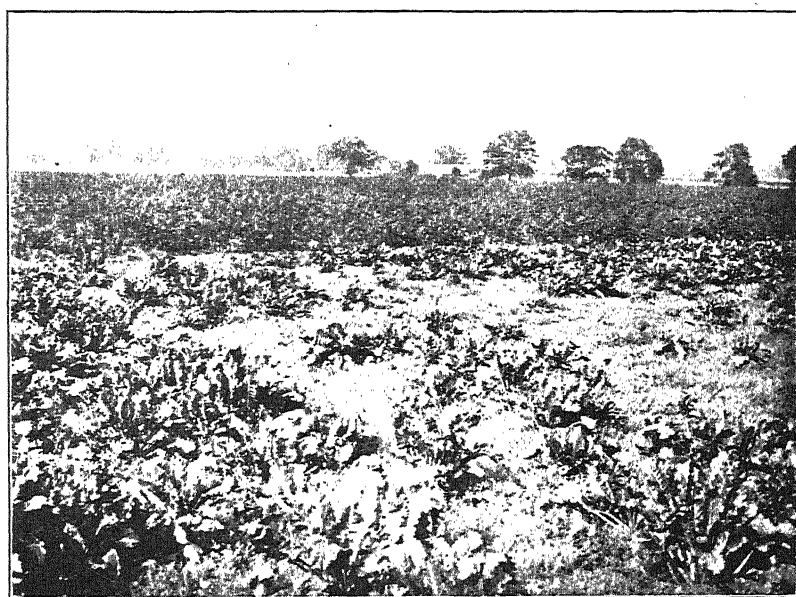


FIG. 2.—A typical instance of sugar-beet failure due to soil acidity, as seen on a farm near St. Albans. A few plants survive on the acid soil; the rest of the space is covered with weeds, mainly spurrey.

Photos: H. W. Gardner.

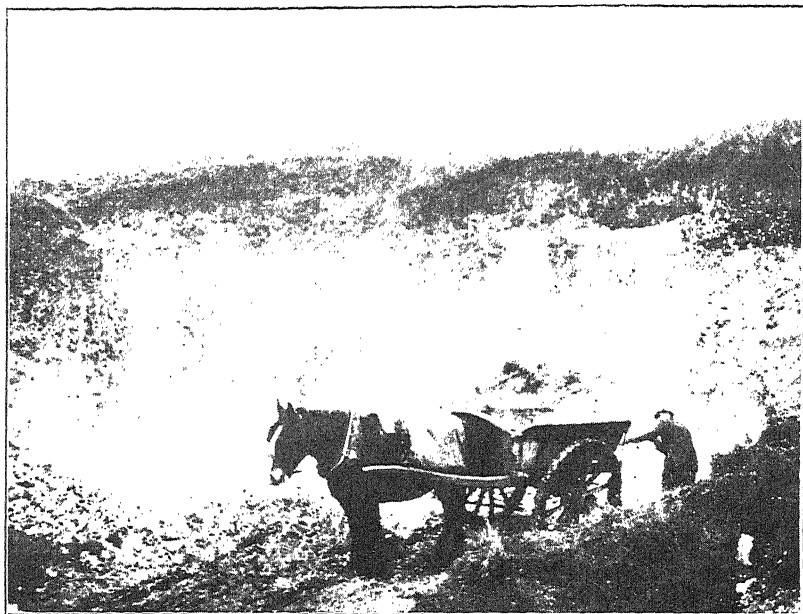


FIG. 3.—Chalk being carted during the winter on a farm near St. Albans. The soil of the field in which the pit is situated was sufficiently acid to cause a failure of red clover.



FIG. 4.—The chalk being distributed on the acid soil. Revival of the old practice of chalking during the winter months is worth considering in many parts of the country.

Photos: H. W. Gardner.

Horticultural Crops and Lime.—In general, it may be said that horticultural crops are similar to agricultural ones in their need for lime, members of the leguminous and cruciferous families being most sensitive to a deficiency. Leguminous crops probably suffer direct injury by the soil acidity, while Crucifers are more likely to suffer indirectly through the incidence of "finger-and-toe," or "club-root."

Rhubarb is an interesting example of a crop that can tolerate more acid conditions than even rye or potatoes, a fact that helps to account for its extensive growth around Leeds and other West Riding towns where even the rain is acid in reaction. More widely known is the intolerance for lime of rhododendrons, azaleas, and heaths, these often being described as calcifuges.

Another example is that of tomatoes, which, from their relationship to potatoes, might be expected to tolerate acid conditions. It has, however, been the custom of growers of crops under glass to give heavy dressings of lime annually, their action being comprehensible in the absence of reliable experimental results. Experiments at Cheshunt indicated that such dressings were unnecessary, and might actually depress the crop. In 1930 and 1931, a 32-plot randomized block experiment was carried out under glass at "Oaklands" to confirm, on an entirely different soil, the Cheshunt results showing the low requirements of tomatoes for both lime and phosphates. A very low experimental error was obtained in both years but there was no response whatever to any of the basal dressings of lime or phosphate.

For fruit trees, the position regarding lime has been concisely summed up by Dr. T. Wallace ("Manuring of Fruit Plantations and Orchards," *Roy. Agric. Soc.* Vol. 92, 1931). He states that in spite of the popularity of lime for stone fruits in particular, "no critical experiment in this country has ever shown that liming is beneficial to fruits on the classes of soils utilized for fruit growing, though, on the other hand, many cases are known where calcareous soils are unsuitable for fruit growing due to high lime content resulting in the development of lime-induced chlorosis. Observation shows that various fruit plants utilized in this country thrive on slightly acid soils and . . . where poor results have been obtained with fruit on acid soils, liming has had negative results, whereas favourable responses have followed from applications of potash fertilizers."

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended October 18				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	7 8d	7 8d	7 8d	7 8d	9 7
„ „ Granulated (N. 16%) ..	7 8d	7 8d	7 8d	7 8d	9 3
Nitrate of lime (N. 13%) ..	..	..	..	7 5	11 2
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 15d	6 15d	6 15d	6 15d	6 7
Calcium cyanamide (N. 20.6%)	7 0e	7 0e	7 0e	7 0e	6 10
Kainit (Pot. 14%) ..	3 6	3 0	2 17	3 0g	4 3
Potash salts (Pot. 30%) ..	5 2	5 1	4 17	4 17g	3 3
„ (Pot. 20%) ..	3 15	3 9	3 6	3 10g	3 6
Muriate of potash (Pot. 50%) ..	9 4	9 1	8 15	8 17g	3 6
Sulphate „ „ (Pot. 48%) ..	10 7	10 7	10 0	10 1g	4 2
Basic slag (P.A. 15½%)|| ..	2 10e	2 0e	..	2 6e	2 11
„ (P.A. 14%)|| ..	2 6e	1 16e	1 16e	2 3e	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	3 2	..	3 4	2 16k	3 6
„ (S.P.A. 13½%) ..	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	7 15	6 15	6 10f	6 7	..
Steamed bone-flour (N. 2½%, P.A. 27½-29½%) ..	5 5	5 12	5 5f	5 7	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

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Comparative Composition of Feeding Stuffs.—From queries that are received from time to time, it would appear that many feeders experience difficulty in making up mixtures for their stock, through their not fully understanding how the more commonly-employed foods vary, the one from the other, in composition. A useful guide is to divide the feeding stuffs into three groups according to their protein content. These groups, together with the nutritive ratio of each feeding stuff, are given below. By nutritive ratio is meant the ratio that exists in any feeding stuff between the digestible protein and the combined digestible fat and carbohydrates. For feeding purposes 1 lb. of fat is reckoned to be equivalent in feeding value to about 2.3 lb. of carbohydrate matter.

<i>Group 1. Foods rich in Protein:</i>		<i>Nutritive Ratio.</i>	
Fish Meal, Meat Meal, Blood Meal	I	:	—
Decorticated Ground-nut Cake and Meal ..	I	:	1
Decorticated Cotton Seed Cake and Meal ..	I	:	1
Soya-bean Cake and Meal	I	:	1
Linseed Cake	I	:	2
<i>Group 2. Foods moderately rich in Protein:</i>			
Beans	I	:	2
Peas	I	:	3
Maize Gluten Feed	I	:	3
Malt Culms	I	:	3
Brewers' Grains (dried)	I	:	4
Palm Kernel Cake	I	:	4
Coconut Cake	I	:	4
Bran	I	:	4
Coarse Middlings (sharps)	I	:	5
<i>Group 3. Foods low in Protein and high in Carbohydrates:</i>			
Maize Germ Meal	I	:	7
Oats	I	:	7
Wheat	I	:	7
Flaked Maize	I	:	7
Rice Meal	I	:	9
Barley	I	:	10
Maize	I	:	11

It will be seen that the home-grown concentrates, with the exception of beans and peas, are low in protein and high in carbohydrates, so that, where beans and peas are not grown on the farm, it becomes necessary for the farmer to purchase some food or foods rich in protein if he wishes to feed a ration containing more protein than is represented by a nutritive ratio of 1:6. Stock that are pregnant or in milk, young growing animals, and those in the earlier stages of fattening, require more protein than would normally be supplied with a ration having a nutritive ratio of

NOTES ON FEEDING

the nature indicated. The word "fattening," a term used popularly to describe the process of "fitting" an animal for slaughter, is really a misnomer, as at the present day excess of fat is not required in any class of stock when ready for slaughter. When animals are fed steadily from birth for the purpose of providing meat for human consumption, the daily live-weight increase will consist to a considerable extent of growth of muscle or lean flesh, and it should be borne in mind by feeders that it is only the proteins in foods that can be utilized for the production of lean flesh or muscle—hence the necessity of an adequate supply of protein to stock if maximum growth and suitability of carcass are to be secured.

Of the foods rich in protein, fish meal at £15 per ton is the dearest, as this price represents about 4s. per unit. Soya bean cake and meal, decorticated ground-nut cake, decorticated cotton-seed cake and meal, all in the neighbourhood of £7 per ton, are at roughly 2s. per unit. Linseed cake at about £8 10s. per ton is dearer, this price representing about 2s. 3d. per unit.

Of foods in the middle group, maize gluten feed at under £6 per ton, and palm-kernel meal at £5 5s. are good value; these prices work out at 1s. 4d. per unit, so that these two foods provide cheap protein. Palm kernel can be obtained in cube form and is specially suitable for feeding out of doors to in-calf cows and heifers.

In regard to the starchy feeds, i.e., those rich in carbohydrates, maize meal at £5 5s. per ton costs about 1s. 1d. per unit, and feeding barley at £5 10s. about 1s. 6d. per unit. Generally, it will be seen that the protein-rich foods are the dearer, while for a considerable time maize has been a cheap source of heat and energy. The inclusion of maize in fattening rations, particularly for stock out of doors in winter, is recommended, but any excess of maize is likely to produce a fat type of carcass. With bacon pigs this is likely to affect adversely the grading of the carcasses: maize may be used, however, up to 20 or 25 per cent. of the ration, but special care is necessary to avoid using with it other foods likely to produce a soft or fatty carcass. For this reason bean meal is useful in combination with maize, as it has a hardening effect, and to some extent counteracts the harmful effect that excessive maize feeding may have on the carcass. Maize gluten feed would not be a suitable food to feed with maize meal.

NOTES ON FEEDING

Protein for Pigs.—The question whether fish meal or a protein of animal origin should be fed to bacon pigs has given rise to some discussion. Dr. Crowther has pointed out that, in his experiments with bacon pigs, a vegetable form of protein, such as that contained in soya bean meal plus minerals, has given satisfactory and more economical results than fish meal. It is more difficult, however, to ascertain the comparative effect of animal protein and soya bean meal in the case of pregnant or suckling sows, as with breeding stock it is practically impossible, experimentally, to eliminate all other contributing factors except the effect of the two particular forms of protein. Observation, coupled with methods of trial and error in a breeding herd over a period of some twelve years, appears to leave little room for doubt that, for breeding stock, an allowance of animal protein is the safer and, in the long run, the more economical method of feeding. It may be that 5 per cent. of animal protein is sufficient, and although there is no desire to dispute the contention that vegetable protein plus minerals may be the more economical supplement to the ration for bacon pigs, actual results of recent Danish experiments, where the basal rations consisted of barley, wheat, and maize, show that the addition of blood meal, and meat and bonemeal to the basal rations, gave better results in live-weight gain in relation to food units consumed. The Harper Adams experiments raise a question as to the feeding of the bacon pigs' dams, and the piglings' own food in the suckling period before they were put on the "baconing" rations. An individual feeding stuff may express something other than its normal and characteristic value if the animal to which it is given can temporarily protect itself from food nutrient deficiency by drafts upon the nutritive reserves of its own body. Bearing this in mind, it would seem that the question whether animal protein can safely be eliminated from the food of the sow, and her progeny, from the time of service until the litter is sold at bacon weight, still remains to be answered. The feeder would appear, however, to be on safe ground in replacing animal protein with, say, soya bean meal in the ration of the baconer, provided that the rations of the individual pigs themselves in their early stages, and those of their dam from service onwards, were qualitatively complete and quantitatively sufficient.

NOTES ON FEEDING

Milk Production, Quality of Milk.—In Czechoslovakia, the Ukraine and elsewhere, milch cows are still used for work upon the land. A report of the Agricultural College, Brunn, gives data regarding the milk yield and butter-fat percentage of cows under varying conditions of draught work. Eight cows with an average yield of 6,336 lb. in the previous lactation were treated as controls, and compared with eight similar cows whose average yield had been 6,102 lb.; and which were put to draught work. The report states that the cows could undertake light farm work such as harrowing, carting, and so on, for half the day, at little or no sacrifice of milk yield, and that the percentage of butter-fat in the milk of the cows at work was actually raised. One realizes that it is not a practical proposition to put cows to draught work under ordinary conditions in this country, but the experiment would seem to point to the desirability of investigating the question of the effect of exercise upon the quality of milk. It has recently been noted that while low butter-fat occurred in liberally-fed dairy herds, at the same period cows kept on a lower plane of nutrition were giving milk of normal or higher standard, while the average quantity of milk given per cow in both sets of herds was not materially different. Is it possible that something in the nature of a pathological condition, due to high feeding with insufficient exercise, may sometimes be responsible for the butter-fat falling below the legal standard, and that this condition might be overcome by suitable exercise combined with greater control of the amount of the more nutritious food given?

Dried Beet Pulp for Horses.—With the approach of the winter feeding season, it is perhaps opportune to draw attention to the danger of feeding dry beet pulp to farm horses. In *The Veterinary Record*, Blackwell has described two instances in which horses suffered from impaction of the œsophagus following the ingestion of dried and unsoaked beet pulp, both proving fatal. The allowance of the pulp had been at the rate of half a gallon per head. Post-mortem examination showed that the œsophagus was impacted with pulp throughout its entire length, and death was caused by asphyxiation. Similar cases have been reported by other veterinarians. It is advised that great care should be exercised in feeding dried beet pulp to horses, and that it should not be given unless it has been previously soaked in water for 24 hours.

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	4 18	0 8	4 10	72	1 3	0.67	9.6
Barley, British Feeding	5 17½	0 7	5 10	71	1 7	0.85	6.2
" Danubian	4 15	0 7	4 8	71	1 3	0.67	6.2
" Russian	4 7½	0 7	4 0	71	1 2	0.62	6.2
Oats, English white	5 13	0 8	5 5	60	1 9	0.94	7.6
" " black and grey	5 13	0 8	5 5	60	1 9	0.94	7.6
" Canadian No. 2 Western	6 8	0 8	6 0	60	2 0	1.07	7.6
" " No. 3	6 5	0 8	5 17	60	1 11	1.03	7.6
" " mixed feed	5 7	0 8	4 19	60	1 8	0.89	7.6
" Argentine	5 18	0 8	5 10	60	1 10	0.98	7.6
" Russian	5 10†	0 8	5 2	60	1 8	0.89	7.6
Maize, Argentine	4 7	0 6	4 1	78	1 0	0.54	7.6
" Gal. Fox.	4 7†	0 6	4 1	78	1 0	0.54	7.6
" Russian	3 17½	0 6	3 11	78	0 11	0.49	7.6
" South African	5 5†	0 6	4 19	78	1 3	0.67	7.6
Beans, English Winter	5 3½	0 15	4 8	66	1 4	0.71	19.7
Peas, English, blue	11 5½	0 13	10 12	69	3 1	1.65	18.1
" Japanese	21 15†	0 13	21 2	69	6 1	3.26	
Dari,	6 2†	0 7	5 15	74	1 7	0.85	7.2
Milling offals—Bran, British	5 10	0 14	4 16	43	2 3	1.20	9.9
" broad	6 5	0 14	5 11	43	2 7	1.38	10
Middlings, fine imported	5 15	0 12	5 3	69	1 6	0.80	12.1
" coarse British	5 15	0 12	5 3	56	1 10	0.98	10.7
Pollards, imported	4 17	0 12	4 5	62	1 4	0.71	11
Meal, barley	6 10	0 7	6 3	71	1 9	0.94	6.2
" " grade II	5 15	0 7	5 8	71	1 6	0.80	6.2
" maize	5 7	0 6	5 1	78	1 4	0.71	7.6
" " South African	5 0½	0 6	4 14	78	1 2	0.62	7.6
" " germ	5 10	0 10	5 0	79	1 3	0.67	8.5
" locust bean	7 0	0 5	6 15	71	1 11	1.03	3.6
" bean	8 0	0 15	7 5	66	2 2	1.16	19.7
" fish	15 0	1 17	13 3	59	4 5	2.37	53
Maize, cooked flaked	5 15	0 6	5 9	84	1 4	0.71	9.2
" gluten feed	5 17	0 10	5 7	76	1 5	0.76	19.2
Linseed cake, English, 12% oil	8 17	0 18	7 19	74	2 2	1.16	24.6
" " " 9%	8 12	0 18	7 14	74	2 1	1.12	24.6
" " " 8%	8 7	0 18	7 9	74	2 0	1.07	24.6
" " " 6%	8 12½	0 18	7 14	74	2 1	1.12	24.6
Soya-bean cake, 5½% oil	7 2½	1 5	5 17	69	1 8	0.89	36.9
Cottonseed cake—English, Egyptian seed, 4½% oil	4 17	0 17	4 0	42	1 11	1.03	17.3
" " English, Indian							
seed, 4% oil	4 15½	0 17	3 18	42	1 10	0.98	17.3
" Egyptian, 4½% oil	4 10	0 17	3 13	42	1 9	0.94	17.3
" decorticated 8%	6 15†	1 5	5 10	68	1 7	0.85	34.7
" meal, decorticated 7.8%	6 15†	1 5	5 10	68	1 7	0.85	34.7
Coconut cake, 6% oil	6 0†	0 16	5 4	77	1 4	0.71	16.4
Ground-nut cake, 6.7% oil	6 10	0 17	5 13	57	2 0	1.07	27.3
" " decor. 6.7% oil	7 12	1 5	6 7	73	1 9	0.94	41.3
Palm-kernel cake, 4½-5½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 4½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 1.2% oil	5 5	0 11	4 14	71	1 4	0.71	16.5
Feeding treacle	5 0	0 8	4 12	51	1 10	0.98	2.7
Brewers' grains, dried ale	5 10	0 10	5 0	48	2 1	1.12	12.5
" " " porter	5 2	0 10	4 12	48	1 11	1.03	12.5

§ At Hull. † At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of September, 1933, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 18s. per ton as shown above, the food value per ton is £9 2s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 6d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.34d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs.

NOTES ON FEEDING

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6·2	4 11
Maize	78	7·6	4 9
Decorticated ground-nut cake ..	73	41·3	7 12
„ cotton cake ..	68	34·7	6 15

(Add ros. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1·29 shillings, and per unit protein equivalent, 1·87 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

In accordance with the recommendation of this Committee the “ food values ” given in the following table may be taken as applicable to the ensuing four months, December to March, inclusive, for the purposes of advisory schemes on the rationing of dairy cows.

FARM VALUES.

CROPS	Starch equivalent	Protein equivalent	Food value per ton, on farm
Per cent.	Per cent.	£ s.	
Roots—			
Kohl Rabi	8	0·5	0 11
Mangolds	7	0·4	0 10
Potatoes	18	0·8	1 5
Swedes	7	0·7	0 10
Turnips	4	0·4	0 6
Green Foods—			
Cabbage, drumhead ...	7	0·9	0 11
„ open-leaved ...	9	1·5	0 14
Kale, marrow stem... ..	9	1·3	0 14
Silage, vetch and oats ...	13	1·6	1 0
Hay—			
Clover hay	38	7·0	3 2
Lucerne hay	29	7·9	2 12
Meadow hay, poor ...	22	2·9	1 14
„ „ good... ..	37	4·6	2 16
„ „ very good ...	48	7·8	3 17
Seeds hay	29	4·9	2 7
Straws—			
Barley straw	23	0·7	1 11
Bean straw	23	1·7	1 13
Oat straw	20	0·9	1 7
Wheat straw	13	0·1	0 17
Grains and seeds—			
Barley	71	6·2	5 3
Beans	66	19·7	6 2
Oats... ..	60	7·6	4 12
Peas... ..	69	18·1	6 3
Wheat	72	9·6	5 11

*Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2. price 6d. net.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE general index number of the prices of agricultural produce for September at 107 was 2 points higher than a month earlier and 3 points above the figure recorded a year ago. The advance on the month of 2 points was due chiefly to the rise in the contract prices of milk. There were increases also in the values of barley, fat pigs, and hay, but these were mostly offset by decreases in wheat, fat cattle and sheep.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

<i>Month.</i>	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	102
June	153	140	131	123	111	100
July	145	141	134	121	106	101
August	144	152	135	121	105	105
September	144	152	142	120	104	107
October	139	142	129	113	100	—
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—At an average of 4s. 9d. per cwt., wheat was 1s. per cwt. cheaper on the month and the index declined by 9 points to 63, while a reduction of 3d. to 5s. 3d. per cwt. in the average for oats caused the index to fall one point to 78. Barley, however, was 1s. 3d. per cwt. dearer and the index appreciated by 4 points to 129. As compared with a year ago, wheat was 11d. and oats 1s. 3d. per cwt. cheaper, but barley was 2s. 2d. per cwt. dearer.

Live Stock.—Prices for both fat cattle and sheep continued to decline, the index for the former being one point lower at 99 and for the latter 3 points lower at 100. Fat pigs, however, showed a further advance, the indices for baconers and porkers being 101 and 106 respectively as compared with 95 and 96 a month ago. Store cattle again weakened and were 6 per cent. cheaper than in 1911-13 but dairy cows advanced 6 points. Store pigs also rose in price and the index was 17 points above that for August, while the index for sheep was unchanged.

MISCELLANEOUS NOTES

Dairy and Poultry Produce.—The average contract price for milk was higher than in August and the index advanced 10 points to 160. Butter also appreciated in price and was only 2 per cent. cheaper than in 1911-13 as against 8 per cent. below in August. The index for cheese, however, was reduced 5 points to 110. The seasonal rise in the price of eggs was not so pronounced as in the base period and the index fell 2 points to 115. In the corresponding period of 1932, eggs advanced 9 points to 124. Quotations for poultry showed little alteration.

Other Commodities.—The index for potatoes rose by 8 points to 99, but was 15 points below the level of September, 1932. A further slight increase occurred in the prices of hay, the combined index at 73 being 2 points above the August figure. Wool was $\frac{1}{2}d.$ per lb. dearer and the index at 76 was 4 points higher. As regards fruit, the indices for apples, plums and pears were well below last year's figures. Most vegetables, however, were considerably dearer as compared with both a month and a year ago.

Monthly index numbers of prices of individual commodities. Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	Sept.	Sept.	June	July	Aug.	Sept.
Wheat	63	76	80	81	72	63
Barley	118	103	94	88	125	129
Oats	83	96	77	75	79	78
Fat cattle... ..	122	112	95	98	100	99
" sheep... ..	131	86	114	107	103	100
Bacon pigs	90	84	97	94	95	101
Pork "	102	87	96	93	96	106
Dairy cows	120	112	104	105	104	110
Store cattle	123	109	94	96	98	94
" sheep	133	80	83	87	83	83
" pigs	129	86	106	108	115	132
Eggs	120	124	102	103	117	115
Poultry	130	124	132	126	120	121
Milk	157	150	138	142	150	160
Butter	107	94	91	94	92	98
Cheese	108	116	121	125	115	110
Potatoes	185	114	80	95	91	99
Hay	86	69	69	68	71	73
Wool	70	62	63	72	72	76

MISCELLANEOUS NOTES

Travelling Scholarship in Agriculture

THE Travelling Scholarship in Agriculture, offered by the College of Estate Management, has been awarded this year to Mr. G. H. R. Bishop, B.Sc., the subject of whose research work will be Pig Management, with special reference to pig recording and litter testing.

The Scholarship, of the value of £300, is offered by the Governors of the College for the purpose of studying agricultural conditions in this country and abroad, and is open to British-born graduates of a British University, or to those holding such qualifications as may be approved by the Board of Governors.

Farmers' Empire Tours.—The 10th tour of Empire Farmers, organized by the British National Union, has been arranged to take place in the Union of South Africa and Southern Rhodesia during the early months of next year. Although primarily intended for persons interested in agriculture, the inclusion of others connected with allied industries may be considered. The party will leave Southampton on January 19, returning on April 23, thus avoiding most of the British winter. The itinerary includes Capetown, Durban, Bloemfontein, Pretoria, Johannesburg, the diamond mines of Kimberley, Salisbury, Bulawayo, the Victoria Falls, the ruins at Zimbabwe, and the Game Reserve; and facilities will be afforded for a thorough investigation of agricultural conditions in the districts visited. Inquiries regarding the tour should be addressed to the Organizing Secretary of the Union, 404, Moorgate Station Chambers, London, E.C.2.

The National Diploma in Dairying.—At this year's examination for the National Diploma in Dairying, held by the National Dairy Examination Board in September last, 100 candidates presented themselves, 68 at the centre for England and Wales (the University and British Dairy Institute, Reading), and 32 at the centre for Scotland (the Dairy School for Scotland, Auchincruive, Ayr). Of the total number, 20 (14 at Reading and 6 at Auchincruive) appeared for re-examination in subjects in which they had previously failed, and 2 (at Reading) for examination in Part 1 only.

Of the 68 English and Welsh candidates, 37 (17 men and 20 women) were awarded the Diploma, one, Mr. R. J. Gayton, obtaining honours. Of the successful candidates at Reading, 13 (including the honours candidate) came from the University and British Dairy Institute, Reading; 5 from the Lancashire County Council Dairy School, Hutton, Preston; 5 from the East Anglian Institute of Agriculture, Chelmsford; 5 from Studley College for Women, Warwickshire; 5 from Seale-Hayne Agricultural College, Newton Abbot; 3 from the Midland Agricultural College, Sutton Bonington; and 1 from the University College of Wales, Aberystwyth. One candidate, from the Midland Agricultural College, was successful in passing the examination in Part 1, and is entitled to present himself for Part 2 in 1934.

Of the 32 candidates at the Scottish centre, all of whom were trained at the Dairy School for Scotland, 14 (6 men and 8 women) were awarded the Diploma, one, Mr. John Thacker, obtaining honours.

The Examiners at both centres were:—Messrs. A. F. Smith, N.D.A., N.D.D., C.D.D., Edward Capstick, M.C., M.Sc., N.D.A., N.D.D. (Hons.), T. J. Drakeley, D.Sc., Ph.D., F.I.C., A. R. T. Mattick, B.Sc., Ph.D., and H. W. Kersey.

MISCELLANEOUS NOTES

Foot - and - Mouth Disease.—During the past month there have been twenty-one outbreaks of Foot-and-Mouth Disease in England. These cases have occurred in four separate districts and have necessitated the imposition of restrictions on the movement of cattle, sheep, pigs, goats and deer in parts of the counties of Bedford, Cambridge, Essex, Gloucester, Hertford, Huntingdon, Isle of Ely, Lincoln, Norfolk, Somerset and Suffolk. [October 28, 1933.]

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on October 23, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Cambridgeshire and Isle of Ely.—An Order continuing the operation (with a modification in regard to the week in which Boxing Day falls) of the existing minimum and overtime rates of wages from November 1, 1933 (i.e., the day following that on which the existing rates are due to expire), until January 31, 1934. The minimum rates of wages for male workers of 21 years of age and over employed wholly or mainly as horsemen, cowmen or shepherds (other than workers employed solely as stockmen or yardmen) are 37s. per week of the hours necessary for the performance of their customary duties; for other male workers of 21 years of age and over, 30s. per week of 40 hours in the week in which Christmas Day falls, and 48 hours in any other week, with overtime at 8d. per hour on weekdays (excluding Christmas Day) and 10d. per hour on Sundays and Christmas Day, and for female workers of 18 years of age and over 5½d. per hour with overtime at 7d. per hour.

Northants and Soke of Peterborough.—An Order continuing the operation of the existing minimum and overtime rates of wages from October 29, 1933 (i.e., the day following that on which the existing rates are due to expire), until March 4, 1934. The minimum rates for male workers of 21 years of age and over are 30s. per week of 41 hours in the week in which Christmas Day falls and 50 hours in any other week, with overtime at 9d. per hour on weekdays and 11d. per hour on Sundays and on Christmas Day. The minimum rate for female workers of 18 years of age and over is 6d. per hour, with overtime at 7½d. per hour on weekdays and 9d. per hour on Sundays and Christmas Day.

Oxfordshire.—An Order fixing minimum and overtime rates of wages to come into force on October 29, 1933 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until February 3, 1934. The minimum rates for male workers of 21 years of age and over are 28s. per week of 31 hours in the week in which Christmas Day and Boxing Day fall, and 48 hours in any other week, with overtime at 8d. per hour on weekdays and 10d. per hour on Sundays, Christmas Day and Boxing Day. The minimum rate for female workers of 18 years of age and over is 6d. per hour, with overtime at 7½d. per hour on weekdays and 9d. per hour on Sundays, Christmas Day and Boxing Day.

Yorkshire (East Riding).—(1) An Order continuing the operation of the existing minimum and overtime rates of wages from November 24, 1933 (i.e., the day following that on which the existing rates are due to expire), to November 23, 1934. The minimum rates in the case of male workers are: for workers living in, 32s. per week or £81 12s. per year for foremen; 29s. per week or £73 19s. per year for beastmen and shepherds; 28s. per week or £71 8s.

MISCELLANEOUS NOTES

per year for waggoners, with lesser rates for lads and beginners; and for workers of 21 years of age and over, not boarded and lodged by their employer, 32s. per week, the hours in respect of which the foregoing rates are payable being 39½ in the week in which Christmas Day falls, 43 in the week in which Good Friday falls, 52½ in any other week in summer (i.e., from March 5, 1934, to October 27, 1934), and 48 in any other week in winter (remainder of the year), with, in addition in the case of workers living in, not more than 12 hours per week on weekdays and 3 hours on Sundays spent in the care of and attention to stock. The overtime rates of wages for male workers of 21 years of age and over are 10d. per hour on weekdays and 1s. per hour on Sundays, Good Friday and Christmas Day. The minimum rates of wages for female workers of 16 years of age and over are 6d. per hour, with overtime at 9d. per hour.

(2) An Order fixing special differential rates of wages for overtime employment on the corn harvest of 1934. For male workers of 21 years of age and over who are not boarded and lodged by their employer, the rate is 1s. 3d. per hour, and for male workers who are boarded and lodged by their employer, 1s. per hour for foremen, beastmen, shepherds and waggoners and stockmen. For female workers of 16 years of age and over the rate is 11d. per hour.

Yorkshire (West Riding).—An Order fixing minimum and overtime rates of wages to come into operation on November 24, 1933 (i.e., the day following that on which the existing rates are due to expire), and to remain in operation until May 23, 1934. The minimum and overtime rates are in all cases 5 per cent. less than those at present in force. For male workers living in the minimum rates range from 29s. 11d. per week or £77 15s. 8d. per annum for foremen, to 20s. 5d. per week or £53 1s. 8d. per annum for workers in their first and second years of employment. These sums, which include the value of board and lodging as defined by the Committee, are in respect of a week of 48 hours in winter and 52½ hours in summer, with, in addition, not more than 12 hours per week on weekdays and 3 hours on Sundays to cover work in connexion with the care of and attention to stock. For waggoners and other horsemen, beastmen and shepherds not living in, the minimum rates are 38s. 6d. per week for workers of 21 years of age and over. For other male workers of 21 years of age and over the minimum rate is 32s. 9d. per week of 48 hours in winter and 52½ hours in summer. In the case of casual workers equivalent hourly rates apply. The overtime rates for male workers of 18 years of age and over are 10½d. per hour on weekdays and 1s. 0½d. per hour on Sundays. For female workers the minimum rates are: for workers of 18 years of age and over 4½d. per hour, and for workers under 18 years of age 3½d. per hour for a week of 44 hours, with overtime in each case at 5½d. per hour.

Radnor and Brecon.—An Order continuing the operation of the existing minimum and overtime rates of wages from November 1, 1933 (i.e., the day following that on which the existing rates are due to expire), until April 30, 1934. The minimum rates for male workers of 21 years of age and over are 29s. 6d. per week of 50 hours in winter and 54 hours in summer, with overtime at 9d. per hour. For female workers of 18 years of age and over the minimum rate is 5d. per hour, with overtime at 6½d. per hour on weekdays and 7½d. per hour on Sundays.

Carmarthenshire.—An Order continuing the operation of the existing minimum and overtime rates of wages from November 15,

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1933 (i.e., the day following that on which the existing rates are due to expire), until November 14, 1934. The minimum rates for male workers of 21 years of age and over are 3s. for a 7-day week of 54 hours, with overtime at 8½d. per hour; and for female workers of 18 years of age or over 5d. per hour, with overtime at 6d. per hour.

Enforcement of Minimum Rates of Wages.—During the month ending October 14, legal proceedings were taken against four employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed			Costs allowed			Arrears of wages ordered			No. of workers involved
		£	s.	d.	£	s.	d.	£	s.	d.	
Cambridge and Isle of Ely	Linton ...	1	0	0	0	5	0	34	0	0	1
Wiltshire ...	Swindon ...	7	0	0	—			44	0	4	2
Yorks. E. R.	Hedon ...	4	0	0	1	0	0	147	0	0	4
Yorks, N. R.	Richmond...	—			1	16	0	28	0	0	2
		12	0	0	3	1	0	253	0	4	9

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Devonshire: Miss M. W. Earle, N.D.D., has been appointed Instructor in Rural Science (Dairying and Poultry-keeping), *vice* Miss I. M. Unkles, N.D.D., C.D.P.

Hampshire: Mr. R. H. Smith, B.Sc.(Agric.), has been appointed Principal of the County Farm Institute, Sparsholt, *vice* Mr. J. M. Templeton, B.Sc.

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World Agriculture: An International Survey. Pp. vi & 314. (Oxford University Press; London: Humphrey Milford. 1932. Price 12s. 6d.)

The compilers of this work are to be congratulated on the result, for the task they undertook was by no means an easy one. The Study Group of the Royal Institute of International Affairs, which is responsible for the book, sought to make a comprehensive survey of world agriculture for the use of the general reader, a survey which would not be merely the dry bones of statistics, but would give some idea of the underlying forces—economic, social and political—that have contributed to the present world agricultural situation. As such, the book should occupy a special position in agricultural literature, since so much that is written about agriculture nowadays deals exclusively with the national, in contrast with the international, aspects of the question.

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The book first of all discusses the economic factors in the present depressed conditions of agriculture, the trend in production, consumption and international trade, and the course of prices during the last few years. To this is added a general account of the technical progress in agriculture, including developments due to mechanical inventions and to advances in chemical and biological sciences. Here we find not only an almost revolutionary change in technique, but the greatest divergence in the degree to which modern methods are employed, between one country and another. Nothing is more characteristic of the agricultural industry, as compared with most other productive occupations, than the unevenness with which new knowledge and new methods have become established in different parts of the world.

This leads to what are, perhaps, the most interesting parts of this survey, namely, the three chapters dealing with national aims and conditions in agriculture—firstly, in overseas countries; secondly, in Europe; and thirdly, in Asia and the Tropics. It is here that we find reasons for the technical divergence between the agricultural systems of the New and the Old World. Although agriculture remains the principal productive occupation in the great majority of countries, the political and social significance that is attached to it differs profoundly between countries of Europe and countries overseas. It is in the divergence of aim, therefore, that we find the origin of the divergence in policy pursued by individual States. This is described in two further chapters of the Survey.

The book should be of value to all students of agricultural questions and, in particular, to those who are concerned to examine the agricultural aspects of international economic problems.

Mitteilungen aus dem Internationalen Landwirtschafts-institut in Rom (*International Bibliography of Agricultural Economics*). Vol. I, Part I Berichte ü Landw. (Berlin: Paul Parey, 28 and 29, Hedemannstrasse, S.W.II. 1933. Annual Sub., 12 RM.)

This is the first number of a special and important series that will be published from Berlin. It is proposed to issue about eight numbers annually, and this first one covers two months' issues of periodical literature and contains nearly 900 titles.

The library of the International Institute is exceptionally well equipped for the purpose in view, as it is one of the largest and most representative agricultural libraries in the world, possessing more than 250,000 volumes and receiving more than 3,000 current periodicals that are regularly classified and examined.

The work is being done by Dr. S. von Frauendorfer, the Chief Librarian of the Institute, and the intention is to cover the field of agricultural economics in all its branches, including agricultural policy, internal colonization, credit, co-operation, insurance, marketing, prices, taxation, statistics, farm management, farm accountancy, agricultural geography and history, rural education, rural sociology, etc. The titles of all books, pamphlets and periodical articles recently received by the library, and having permanent scientific value, are given with all the bibliographical and other details required for the proper identification of the particular publication. All languages receive the same treatment, and those lesser known are provided with a translation of the title in one of the recognized world languages.

The new bibliography should prove very valuable, as no such special work on agricultural economics that could claim to be international in scope has hitherto been available. It should therefore be indispensable to all agricultural and economic institutes, colleges, schools, libraries, students and research workers interested in one of the most important problems of world economy.

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La Situation critique de l'Agriculture (*The Critical Position of Agriculture*). By Jean Ferté. Pp. 44. (Paris: Librairie Agricole de la Maison Rustique, 26, Rue Jacob, VIe. 1933. Price 10 frs.)

In this small work the author has attempted to depict the critical position of farming in France, with the help of the evidence of five years' cost accounts relating to some 60 farms, half near Soissons, and the balance in the departments of the Aisne, the Oise and Seine et Marne. He states that the farms are sufficiently uniform in size and type to enable average figures to be derived from them. The uses of such averages are manifest. They not only provide information upon which the individual farmer can examine the efficiency of his own farm management, but also a real basis for those who are undertaking the preparation of measures to cure the ills from which farming is at present suffering.

M. Ferté points out that the kind of systematic inquiry upon which his results are based is comparatively new in France, although it has been widely adopted in other countries. The Central Agricultural Accounting Office at Soissons only received official status in 1931, although it had been established for several years; other local offices have been set up at Amiens and Rheims, and there is a Central Office of Farm Accounting and Rural Economy at Paris. The last-named covers a much wider field than is possible for a local office, and its activities include some 250 farms, though these are so widely scattered that it is not at present possible to use the figures collected for the purpose of calculating averages. The more concentrated results of a local inquiry about farms of approximately uniform size and of uniform cropping is, in M. Ferté's opinion, much more useful. He shows that farming in the particular districts with which he deals is suffering from the same kind of financial difficulty that is common to the rest of the world. Costs of production are often higher than the financial return, and it is essential that this condition of affairs be changed. As M. Ferté says himself: if farming involves a loss in good years, how can it become prosperous again?

Traité Complet d'Aviculture (*Complete Treatise on Aviculture*). By Dr. J. Lahaye and Dr. J. Marcq. Pp. 511 and 217 figs. (Gembloux: Jules Duculot, rue Leopold. 1933.)

Some ten years ago a group of professors in the Agricultural Institute at Gembloux, Belgium, initiated a series of volumes of scientific character, under the title "Bibliothèque agronomique Belge," reflecting the instruction given in the premier faculty of that country. Subsequently, members of the staff of the State School of Veterinary Medicine at Cureghem urged the desirability of issuing another library on similar lines, setting forth the teaching and practice of veterinary medicine in accordance with the curriculum observed at that Institution. In order to emphasise the unity of plan underlying the publication of these two libraries, it was decided to issue them under the comprehensive appellation of "Encyclopédie Agronomique et Vétérinaire."

The present work justifies its claim to be a "complete treatise on aviculture." Every branch of the subject is discussed in a clear and detailed manner, and with a special view to the requirements of the practical man. The volume commences with a review of the poultry industry in Belgium, and goes on to deal with such matters as anatomy and physiology. There is a very full discussion of Mendelian principles of heredity, and the latest developments of research in this important subject are shown at a glance. The views of various authorities are given regarding the factors determining the form of combs, weight of poultry, weight and colour of eggs. The second part deals with feeding and hygiene from the standpoint of the most recent research. Incubation, rearing (including battery brooding),

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fattening and egg-production are discussed in the next section. Part IV, entitled "Ethnographie," describes the various races of poultry, ducks, geese, turkeys, pigeons, guinea-fowl, peacocks, pheasants and swans, with historical notes on their evolution and progress.

A book like this should furnish a valuable insight into the poultry-keeping practice of our nearest neighbours, and for more practical reasons still it deserves the attention of poultry-keepers in this country.

Voluntary Allotment. By E. S. Mead, Ph.D., and B. Ostrolenk, Ph.D. Pp. 147. (Philadelphia: University of Pennsylvania Press. London: Humphrey Milford, Oxford University Press, 1933. Price 8s. 6d.)

This book is the work of the joint authors of "Harvey Baum," which was written in 1928 and investigated the causes of the depression in American agriculture that, advancing with accelerating pace, had already become acute before the collapse of general price-levels in 1929 ushered in the world-wide depression in industry and agriculture alike.

The authors indeed emphasize the view that the disappearance of the world depression would not restore unqualified prosperity to American agriculture. Consequently, the solution of the farming crisis does not lie merely in the restoration of normal activity in the industrial centres of America and Europe. It is pointed out that urban consumption of agricultural produce in the United States has not greatly declined since 1929; while, cotton excepted, American agricultural exports were experiencing a continuous and appreciable decline even during the very prosperous years before 1929.

It is the authors' thesis that for many years American industry has been given a privileged position as compared with American agriculture. Urban enterprises, being acknowledged as public utilities, have been afforded a degree of monopoly-control and given the protection of a high tariff, and have thereby been enabled to fix their charges at a level that permitted of high wages, a normal return upon capital invested, and reasonable profits. The farmer has been given no such privileges, and the authors support with statistical evidence their claim that for over a decade returns to agriculture have allowed of no interest at all upon capital sunk in the industry, and of a financial return to the farmer so moderate as to make him less well-paid than his own hired labourers.

The authors affirm that a belated justice requires the compensation of the countryside by the towns. Such a step would of itself go far to revive industrial activity, and so be in the best interests of the towns; for farmers are the main consumers of industrial products, and a root cause of the collapse of industry has been that it appropriated from farmers the very purchasing power which they needed in order to keep industry going.

This argument leads to support of the Voluntary Allotment Plan, the policy of the present Administration and now embodied in law. The Voluntary Allotment Plan was explained in detail in the February, 1933, issue of this JOURNAL (p. 1045), and in essentials is a plan to decrease production through the incentive of a substantial cash bonus for acreage deliberately withdrawn from production, while making the tariff effective in order to prevent imports sold at world prices from checking the consequent rise in domestic price-levels. The urban consumer, and not the Treasury, will pay, since the funds for the cash-bonus system are to be provided by an excise-tax upon processed agricultural products. The authors do not seem quite clear whether agricultural exports will cease completely under the Plan, or whether production will still provide a surplus for export at, of course, prices much below domestic price-levels. They maintain, however, that stability can be attained only if farmers rely upon the home market,

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and that the export trade in all commodities, cotton included, is profitless and could be abandoned without harm to national welfare.

The Plan will depend for its success upon the effectiveness of the cash bonus in reducing production. The thorn in its side will be the farmer who considers it more profitable to forgo the cash bonus and get the higher prices made possible by the Plan for an acreage either maintained at its former level or even increased. The criticism may be made that the authors have not adequately examined possible means of averting this very real danger. Direct limitation of production by a majority coercing a minority is impracticable, for a Federal Act embodying such a principle would conflict with the Constitution and would be invalidated by the Supreme Court. This fact is an interesting commentary upon the possibility of the United States adopting methods similar to those embodied in our own Agricultural Marketing Act.

This book can be thoroughly recommended to English readers for its lively and authoritative description, fortified by a wealth of statistics, of the post-War history of American agriculture. Moreover, the portrayal of the typical American farmer in the person of "Ole Swanson," brought in late middle life from a comfortable prosperity to something less than the status of a hired labourer, his farm foreclosed through the intolerable pressure of fixed mortgage interest payments in a period of falling prices for farm products, and through the return of his sons and daughters, educated, married, unemployed and penniless from the towns to which they had migrated in more prosperous times—this picture cannot fail to make vivid the critical position of the American farmer by the very artlessness of the description.

American Agricultural Policy. By P. C. Campbell. Foreword by Dr. J. S. Davis. Pp. xvii + 304. (London: P. S. King & Son Ltd. 1933. Price 10s. 6d.)

Miss Campbell has written a book of quite exceptional value to the student of American agriculture. It is more than a mere objective account of agricultural conditions, legislation and administrative action by the Federal and State Governments, for it contains many shrewd judgments of the topics covered, as well as an attempt to appraise the value and importance of certain features of agricultural policy that have always attracted the interest of foreign visitors.

The first chapter, entitled "The American Farm," is descriptive and gives a general picture of the "lay-out" of agriculture in the United States. The subsequent chapters are of a more analytical character and give an account of the directions in which Federal and State aid to agriculture has been given. Miss Campbell's interest is evidently mainly in the economic field, and she devotes a large portion of the book to an examination of the work of the Bureau of Agricultural Economics. Not the least interesting is the account given of the evolution and present position of what is known in America as the "Outlook Service"—the compilation of material designed to enable the American farmer to make his plans in the light of the best available knowledge of the existing trends in production, consumption and prices, both within the United States and abroad.

Finally, some account is given of the special relief measures for agriculture that have been adopted or proposed during recent years, including particularly the Agricultural Marketing Act and the establishment of the Federal Farm Board.

Miss Campbell has been a little unfortunate in the moment of publication for a book with the title she has chosen, since American agricultural policy is undergoing a substantial change with the new administration. The book in reality deals with the agricultural policy of the United States up to the end of the Hoover administration, and as such is valuable both as a record and a criticism.

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Plant Pests, &c.

- Wetting, Spreading and Emulsifying Agents for use with Spray Fluids. V. A Partial Phase Rule Investigation of the Miscible Oil System, Phenol—Water—Sodium Oleate—Toluene. *R. M. Woodman*. (Jour. Soc. Chem. Ind. (Trans. and Comm.), 52, 25 (June 23, 1933), pp. 185T-188T.) [63.295.]
- The Use of Chlorates in Weed Control. *D. Clouston* and *A. Hill*. (Trans. Highl. and Agric. Soc., Scotland, 45 (1933), pp. 128-135.) [63.259; 63.295.]

Live Stock

- Manual Labour Requirements of Live Stock on Welsh Farms. *J. L. Davies*. (Welsh Jour. Agric., 9 (1933), pp. 56-70.) [331 (429); 63.191; 63.604.]
- The Suffolk Sheep: A Survey of the Breed. *N. L. Tinley*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 120-129.) [63.631.]
- The Southdown Sheep. *N. L. Tinley*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 130-141.) [63.631.]
- Cattle Feeding. Relative Values of Swedes, Potatoes, Dried Sugar Beet Pulp and Silage in Beef Production. *W. G. R. Paterson*. (Trans. Highl. and Agric. Soc., Scotland, Fifth Ser., 45 (1933), pp. 23-45.) [63.62:043.]
- Photography as a Help in the Examination of Cattle Foods. Structure of the Pod and Seeds of *Canavalia* Spp. *M. N. Lucie-Smith*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 42-48.) [63.62:043.]

Dairying

- Dairying on Second-Class Land. An Examination of Changes in Farming Systems. *A. W. Ashby* and *J. Pryse Howell*. (Welsh Jour. Agric., 9 (1933), pp. 5-17.) [63.191; 63.70.]
- Costs of Production and Prices of Milk. A Study of Some Tendencies. *A. W. Ashby* and *W. H. Jones*. (Welsh Jour. Agric., 9 (1933), pp. 17-28.) [63.714.]
- Farmers' Cost of Milk Delivery in Wales. *J. Pryse Howell*. (Welsh Jour. Agric., 9 (1933), pp. 29-38.) [63.714; 63.716.]
- Milking Times. Inter-County Variations in Time and Interval. *H. Barkworth*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 189-193.) [63.711.]
- The Effect of Feeding on the Fat Content of Cows' Milk. *E. J. Sheehy*. (Jour. Dept. Agric., Irish Free State, 32, 1 (1933), pp. 18-29.) [63.711; 63.711:043.]
- The Nutritive Value of Proteins for Milk Production. I. A Comparison of the Proteins of Beans, Linseed and Meat Meal. *S. Morris* and *N. C. Wright*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 177-196.) [612.394; 63.711:043.]
- Variation in the Composition of Milk in Certain Midland Districts of England during the Years 1923-31. *A. G. Baker* and *H. T. Cranfield*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 246-254.) [63.712.]
- Monthly Variation in the Fat Content of Milk from Welsh Farms. *Phyllis M. Hickson* and *S. B. Thomas*. (Welsh Jour. Agric., 9 (1933), pp. 240-248.) [63.712.]

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- The Composition of the "Isotonic Diluent" in Samples of Milk Low in Solids-not-fat. *W. L. Davies*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 273-278.) [63.712.]
- Some Observations on Cow's Milk Poor in Non-fatty Solids. *G. L. Peskett and S. J. Folley*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 279-284.) [63.712.]
- Van Oijen's Test: A Rapid Method for Counting High-Class Milk. *H. Barkworth*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 197-201.) [576.8:7; 63.712.]
- Coliform Organisms and Keeping Quality of Milk. *H. Barkworth*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 194-196.) [576.8:7.]
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- A Bacterial Milk Taint. *A. Cunningham*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 197-205.) [576.8:7; 63.719.]
- Coliform Organisms in Milk and Bovine Faeces. *Phyllis M. Kon*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 206-212.) [576.8:7.]
- Studies in Bacteriology of Low-Temperature Pasteurisation. Part I. The Significance of Heat-resisting Organisms in Raw Milk Supplies. *E. B. Anderson and L. J. Meanwell*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 213-225.) [576.8:7; 63.717.]
- Discoloration in New Zealand Cheddar Cheese. Muddy, Pink and Bleached Defects. I. Bacteriological Investigations. *G. F. V. Morgan*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 226-237.) [576.8:7; 63.73.]
- Discoloration in New Zealand Cheddar Cheese. Muddy, Bleached and Pink Defects. II. Biochemical Investigations. *G. M. Moir*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 238-245.) [543-2; 63.73.]
- Seasonal Variations in the Keeping Quality of Butter from Five Farms. *G. T. Morgan*. (Welsh Jour. Agric., 9 (1933), pp. 248-255.) [63.721; 63.726.]
- Factors Affecting the Solubility of Milk Powders. II. The Influence of Temperature of Reconstitution on Protein Solubility. *G. R. Howat and N. C. Wright*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 265-272.) [63.715.]
- The Mode of Combination and Distribution of Traces of Heavy Metals in Dairy Products. *W. L. Davies*. (Jour. Dairy Res., 4, 2 (May, 1933), pp. 255-264.) [63.71; 63.713.]

Poultry

- Factors Modifying Egg Production with Special Reference to Seasonal Changes. *Elizabeth O. Whetham*. (Jour. Agric. Sci., 23, 3 (July, 1933), pp. 383-418.) [63.651.]
- The Treatment of Poultry Experimental Data by the Analysis of Variance Method. *H. B. Bescoby*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 202-218.) [63.651.]

Diseases and Pests of Animals

- A Brief Review of the Researches on the Acute Diseases of Sheep on the Romney Marsh. *A. D. McEwen*. (Jour. S.E. Agric. Coll., Wye, 32 (July, 1933), pp. 171-181.) [619.3.]
- Control of the Sheep Tick on Hill Pastures. A Review of the Possibilities, with some Experimental Data. *J. Macleod*. Trans. Highl. and Agric. Soc., Scotland, Fifth Series, 45 (1933), pp. 114-127.) [59.169.]

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Tractor Trials in Hampshire

THE following note has been communicated by Mr. T. Wannop Williamson, B.Sc., N.D.D., Assistant Agricultural Organizer for Hampshire:—The tractor trials, arranged in connexion with the ploughing match of the North-East Hants Agricultural Association, took place, on October 21, at Temple, Selborne, Alton, by kind permission of the Viscount Wolmer, M.P. The trial ground consisted of 8 acres of light, dry, easy-working loam, situated on a slight slope, up and down which the tractors were tested. The draught of the plough used for the dynamometer tests, when working at normal ploughing depth, amounted to 1,000 lb., while the eleven-tine cultivator, similarly used, had an approximate draught of 1,200 lb.

It may be noted that all the wheels tested were capable of transmitting more power than would be required under ordinary working conditions. All the tractors demonstrated their ability to perform normal work by drawing double-furrow ploughs, cultivators and pitch-pole harrows.

Great interest was taken by visitors in the tests with the dynamometer, which consists of an oil-filled cylinder inserted between the tractor draw-bar and the implement drawn, and shows, on a scale, the pull exerted by the tractor. By increasing the depth of the operation of the implement used until the tractor stalls, it is possible to discover the maximum power that the driving wheels can transmit.

Fordson Tractors with Open-type Wheels.—With the Miller "Non-Zlip" wheels, ploughing on firm ground, a steady pull of 1,500 lb. was maintained, but wheel adhesion

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failed at anything over 1,600 lb. A steady pull of 1,400 lb. was maintained with the cultivator on ploughed ground, but at 1,500 lb. the slip became excessive. With the Darby wheels, there was a steady pull in ploughing up to 1,800 lb., wheel-slip becoming pronounced at about 2,000 lb., but the tractor proceeded until 2,200 lb. was reached. With the cultivator, on loose soil, a steady pull of about 1,500 lb. was maintained, but the limit of wheel adhesion was reached at about 1,800 lb. Open-type wheels would probably prove effective on heavy soil; their performance in this instance was not affected by the slight gradient.

Fordson Tractors with Pneumatic-tyred Wheels.—With Dunlop-tyred wheels, a lower-geared Fordson, tested on its low gear of 1.74 m.p.h., ploughing uphill, maintained a steady pull of 1,600 lb. without slipping; wheel-adhesion failed at 1,800 lb. Downhill, there was a steady pull of 1,800 lb., the limit of wheel-adhesion being reached at 2,000 lb. With the cultivator, a pull of 1,600 lb. uphill was maintained without difficulty, wheel-adhesion failing at 1,800 lb.

With Firestone-tyred wheels, a higher-geared Fordson tractor, tested on its low gear of 2.19 m.p.h., maintained a steady pull, in ploughing uphill, of 2,000 lb., wheel adhesion failing at 2,300 lb. Downhill there was a steady pull of 2,200 lb., with failure of wheel-adhesion at 2,500 lb. Drawing the cultivator on loose soil, there was a steady pull uphill of 1,800 lb., wheel-adhesion failing at 2,000 lb. The downhill figures were 1,900 steady pull, and a limit of 2,100 lb.

General Observations.—The results obtained with the two types of tractor are perhaps not entirely due to the difference in the wheel tyres, as experience has shown that pneumatic tyres have better adhesion at higher speeds. The higher-geared tractor was handled by a driver with great experience in test working.

Pneumatic tyres gave a better grip on the soil than did the open-type wheels. These relative results may be different on heavy or wet soil. The open-type wheels left the cultivated soil in a better condition than did the pneumatic tyres; they also broke up the bottom of the plough furrow.

A plough taking a wide furrow is more suitable for use with a pneumatic-tyred tractor, since the width of the tyre,

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running in the furrow bottom, would spoil the appearance of the work of a narrow-furrow plough.

As the principal object of the trial was to test the types of wheels that are claimed to avoid soil-packing, the standard Fordson tractor was not included.

The New "Bristol" Tractor.—The opportunity was taken to make a preliminary trial of this new tractor, a low-priced machine of the track-laying type. The test was followed by a large number of spectators, and surprise was expressed at the power produced by a tractor of such modest dimensions. The dynamometer results showed a steady pull of 1,600 lb. on firm ground, slipping bringing the machine to a standstill at 1,800 to 2,000 lb. On loose ground, drawing a cultivator, the results were slightly better, and the tracks showed a little less tendency to slip.

Pitch-pole Harrow.—Both pneumatic-tyred tractors were used to test the pitch-pole harrow, working with arable tines, for breaking up the dirty stubble. At ordinary depth, this implement had a draught of 1,000 to 1,200 lb., when rubbish accumulated on the tines until they were ready for tripping. The particular model used in this instance is catalogued by the makers as suitable for working with a lighter type of tractor than those used in this trial; but, as an additional test of wheel adhesion, the implement was permitted to be used at a maximum depth, accumulating rubbish until the tractor stalled. The harrow stood up to this abuse without damage, and gave an excellent performance under normal working conditions.

Ploughs.—The various makes of ploughs performed their work with great credit.

Pneumatic-tyred Farm Cart.—A farm cart, equipped with pneumatic-tyred wheels, carrying a load of 32 cwt., was drawn across the newly-ploughed land with comparative ease by a single horse.

Corrosion of Iron Water-Mains in contact with Ashes

THE possibility that, following this year of drought, many farmers may be contemplating the provision of improved water supplies by connexion to public services prompts a note of warning on the above subject. It has for some time been known in the building world that serious consequences have often followed contact between certain qualities of

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clinker and ashes with iron and steel in such situations as joists embedded in clinker concrete, or conduits and junction-boxes of electrical systems similarly placed. This question formed the subject of a special report of the Building Research Station (No. 15, Stationery Office, 6d. net), and, briefly, the cause of the trouble was located as due to sulphur, which in the presence of moisture and other chemical constituents in cement or soil, would corrode iron or steel in contact.

Recent instances have been brought to the notice of the Ministry, where substantial cast-iron water mains, having unaccountably burst, have been found deeply pitted *externally*, owing to the chance contact of isolated fragments of ash or coal in the filling-in employed to cover them. Anything in the nature of clinker or ash should obviously be avoided for such purposes, and great care should be taken when laying mains in ash-surfaced roadways to ensure that fragments of the surfacing material shall not be placed in contact with the pipes as laid.

Asparagus Rust

OUTBREAKS of plant diseases, especially the more uncommon ones, are often sporadic in character. The reasons for this are not always clear, but weather conditions are often of great importance. The hot weather of the past summer, accompanied by actual drought in some parts of the country, has undoubtedly affected the health of our crops, minimizing the effects of disease in most cases, but probably arousing a few others from a state of latency.

Asparagus Rust (caused by *Puccinia Asparagi* D.C.) would appear to come into the latter category. This disease was first recorded in Britain as long ago as 1824. Cases of it were also noted in England in 1865, 1873 and 1895, while the last recorded reference to it appears to be one relating to 1897. Inquiries, however, have elicited the information that the Rust was seen in the Evesham district in 1899, and was severe there in 1904, 1905 and 1906. Further, at least one case was seen in Cambridgeshire in 1912, while there appears to have been one in a garden in Cambridge only three or four years ago. Thus, although serious outbreaks have not been noted for the past five and twenty years or so, the Rust has continued to exist in small amount to the present day, overlooked by plant pathological surveys.

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The present year (1933) has seen a recrudescence of the disease, fortunately, however, late in the season, so that little damage has yet been done. The first outbreak was discovered at Halesworth (Suffolk), at the end of September, and extensive search during the succeeding six or seven weeks has revealed the occurrence of the Rust in no fewer than twenty-three localities, situated in the counties of Norfolk (4), Suffolk (8), Cambridgeshire (10), and Worcestershire (1). In most of the localities a single outbreak only has been discovered, but in the others more than one has been found. For the most part the attacks are slight, but in some instances they are somewhat intense. It is known that dryness of the soil and the prevalence of dews are factors that encourage this disease, and they have probably come into play this season, particularly in the Eastern Counties.

The Rust, like many others, has three principal sporing stages, and all three are developed on the asparagus plant. There is the "cluster-cup" stage (not very commonly seen, perhaps) that occurs on the "grass" when it is being cut for market. From this follows the rusty, summer-spore stage on the "bower"; and this turns eventually to the black, resting-spore stage, present at the close of the season. By making a bonfire of every bit of the ripening tops (the sooner the better, as the "needles" are fast falling off), something can be done to destroy the resting-spores and thus minimize the chances of attack next season. No other host appears to be attacked by this Rust, but the disease is often perpetuated from odd asparagus plants, not in the beds themselves, but allowed to grow as weeds in odd corners and waste places. Any such plants should be dug up and destroyed.

In the United States of America, Asparagus Rust first made itself evident in 1896, and within a few years it had already become devastating there, both on the Eastern and the Western sides of the continent. The situation was eventually retrieved partly by the raising and introduction of highly resistant varieties (of which perhaps the Martha and the Mary Washington are the most widely known), and partly by scrupulous attention to cultural methods and the requirements of plant hygiene.

It is to be hoped that epidemics of the Rust will not occur in England next season. Should the cluster-cup stage be discovered in the early summer, however, "grass" on

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which it is present should be cut and destroyed. Should the rusty stage set in, attempts should be made to keep it in check by thorough applications of a very finely divided sulphur dust to the bower, at the rate of about $\frac{1}{2}$ cwt. per acre. This treatment will be particularly effective if the prevailing weather is hot and sunny. The first application should be made about three weeks after cutting for market has ceased, and it should be repeated once, or twice, if necessary, with an interval of a month.

Winter Spraying of Fruit Trees

SPRAYING with tar-oil sprays against insect and fungus pests ought to be a routine treatment in every orchard, to be carried out some time during the winter months. These sprays are sold under various proprietary names, and most of the brands are satisfactory. The washes destroy the eggs of the aphides and suckers, and a proportion of those of the winter and other moths. They destroy also the mosses and lichens and reduce Mussel Scale, Codling Moth and Blossom Weevil. Where they are used, there should be no need for the spring nicotine spray, except in districts where the Apple Capsid is troublesome.

It is most important that the instructions of the makers should be followed exactly in applying the sprays. Failure to make them up correctly accounts in many instances for poor results, and sometimes involves injury to the trees. If only very hard water is available, expert advice should be obtained as to the best method of overcoming the difficulty that will be found in mixing.

The washes are admittedly strong, and, in order to avoid risk of injury, should only be used on trees whilst the buds are quite dormant—that is to say, in a normal season between the end of November and the end of February for apples, and from the end of November to the end of January for plums, pears, cherries, currants and gooseberries. Every part of each tree should be sprayed, and spraying should be done in dry weather so that there is time for the spray to dry on the trees before any rain falls. It is a waste of both time and money to spray, or continue to spray, in bad weather. Damage to the trees may result from spraying during frost.

A power-spraying machine is the best to use, but where the work is on a small scale a hand machine is satisfactory as long as the spray can be maintained at a consistent and

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adequate pressure. Since these washes are injurious to foliage, it is worth reminding growers that winter lettuce or other green crops planted underneath fruit trees will be apt to suffer unless they are protected in some way. Also, where a grower decides to delay spraying until the latest safe time arrives for his apple buds—i.e., towards the end of February—by that time buds of gooseberries may be far enough advanced to suffer seriously by the operation.

A further point is that no attempt should be made to mix mineral oil, such as petroleum emulsion, with a tar-distillate wash without expert advice. There is, perhaps, a temptation to do this with the object of making a spray that will be effective not only against aphides, apple suckers and winter moths, but against Red Spider and other pests that are not controlled by tar-distillates. Certain specially-prepared, combined washes of the kind show promise of being very valuable, but serious injury to the trees may result from haphazard mixtures made up in the fields without some knowledge of the constituents and their effects when used together.

A Course in Power Farming

AN excellent opportunity for gaining information on the application of machinery in agriculture is offered by the second Power-Farming Course, to be held by the Harper Adams Agricultural College, Newport, Shropshire, from January 1 to 6, 1934.

While following, broadly, the same lines as the first course, which was so successful this year, the College authorities have arranged a completely new programme, and some of the best-known exponents of power farming in the country will discuss the methods that have proved practically successful. Landowners, farmers and engineers may therefore meet on common ground to exchange experiences and debate the problems that have to be solved on both sides, while arrangements are being made for field demonstrations of a character to suit the season.

The subjects to be dealt with include tractors for row-crop work and their special fittings; combining harvesting and drying; tractor-wheel equipment, including the newly-introduced pneumatic tyre; the mechanical improvement of grass land and the home production of dried grass meal; electricity in farming; problems of the dung cart; recent developments in power tillage and farm refrigeration.

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Among those who have promised to speak are Mr. G. H. Nevile, Wellingore; Messrs. S. J. Wright and J. E. Newman, of Oxford; Mr. J. R. Warburton, Shillingford; and Dr. B. A. Keen, Rothamsted; while certain of the papers will be given by Mr. D. N. McHardy, of the College Engineering Department, who is organizing the course, and who will supply details of the fees and general arrangements on application.

Importation of Elm Trees and Conifers

AN Order has been made by the Minister of Agriculture and Fisheries under the Destructive Insects and Pests Acts, 1877 to 1927, and by arrangement with the Forestry Commissioners under Section 3 (2) of the Forestry Act, 1919, with the object of preventing the introduction into this country of diseases that might prove injurious to forest trees.

This Order, which is entitled the Importation of Elm Trees and Conifers (Prohibition) Order of 1933, and which comes into operation on December 1, 1933, prohibits the landing in England or Wales from any country other than Scotland, Northern Ireland, the Irish Free State, the Isle of Man or the Channel Islands, of any living plants of the following eight genera of the Order Pinaceæ:—*Abies*, *Larix*, *Picea*, *Pinus*, *Pseudotsuga*, *Sequoia*, *Thuja* and *Tsuga*.

The importation of living elm trees from any European country has been prohibited since January 15, 1927, by the Importation of Elm Trees (Prohibition) Order of 1926. That Order is now revoked, but its provisions have been embodied in the new Order and extended to elm trees from any country other than those mentioned in the preceding paragraph.

The Order further requires that the health certificates prescribed under the Importation of Plants Order of 1933 to accompany living plants imported from abroad must include a statement to the effect that the consignment does not contain any plants of the genera now prohibited.

Copies of the Order may be obtained from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2., or through any bookseller, price 1d. net.

APPLE SCAB SPRAYING EXPERIMENTS IN THE WISBECH AREA: THE TIMES OF APPLICATION—II*

W. F. CHEAL, D.I.C.,
Horticultural Superintendent, Isle of Ely County Council.

APPLE Scab spraying trials, conducted in the Wisbech district in 1931 and 1932, showed that, with the variety Worcester Pearmain, two pre-blossom applications of lime-sulphur were essential for the successful control of the Scab fungus on the fruit.

The 1931 results were confirmed by several Wisbech fruit growers, who, in 1932, adopted with great success the two pre-blossom sprays, not only for Worcester Pearmain, but for other varieties† of apples in all their gardens.

The weather conditions at the "green flower" and "pink bud" stages of the blossom (at which the fungicide should be applied) were particularly wet in 1931 and 1932.

The wet weather§ in these two years is an important factor in the interpretation of the spraying results, especially in regard to the planning of Scab spraying programmes for other seasons.

If very dry conditions prevail at the "green flower" and at the "pink bud" stages, the question arises as to whether the Fenland fruit growers should continue to apply lime-sulphur at the "green flower" stage, or whether such an application would be a needless expenditure. Field trials are the best method of obtaining the information required, and it so happened that the spring of 1933 provided an excellent opportunity for the purpose.

The months of April and May in 1933 were particularly dry, for although rain was registered on many days in these months, the total quantities that fell were very small: 1.03 in. of rain were recorded in April, and 1.36 in. in May.

An Apple Scab spraying trial was planned on trees of the variety Emneth Early (Early Victoria), a kind largely

* A previous article on this subject appeared in the issue of this JOURNAL for February, 1933, p. 993.

† 1932 experiments by W. A. R. Dillon Weston and F. R. Petherbridge confirm the results with the variety Cox's Orange Pippin, but not with the variety Blenheim Orange.

§ Rainfall:—

	1931	1932
April	2.51 in.	2.47 in.
May	2.52 ..	3.98 ..

APPLE SCAB SPRAYING EXPERIMENTS

grown in the Wisbech area, and one that, of late, has shown some susceptibility to Scab, although much less than Worcester Pearmain.

Sixteen twelve-year-old bush trees of Emneth Early growing in the Wisbech demonstration plot were divided into four equal groups. The trees were growing in cultivated land among three-quarter-standard Bramley Seedling trees. They were uniform in size, about 14 ft. high, and about 16 feet in span. Their branches were well spaced and spur pruned, but their leaders had been left untipped.

Close attention had been given to Scab control in the previous year, and the disease on the fruit had been well mastered.

The groups of four trees were sprayed with lime-sulphur as follows:—

Plot 1.—Two pre-blossom applications, at (i) "green flower" and (ii) "pink bud" stages, with two post-blossom applications at (iii) "petal fall" and (iv) two or three weeks later.

Plot 2.—Two pre-blossom applications (as for Plot 1) followed by one post-blossom application at (iii) "petal fall."

Plot 3.—Unsprayed.

Plot 4.—One pre-blossom application at (ii) "pink bud," and with two post-blossom applications as for Plot 1.

Lime-sulphur of a well-known brand was used at the strength of 1 in 30 for the pre-blossom, and at 1 in 60 for the post-blossom applications. Arsenate of lead was added to the fungicide used at (iii) "petal fall."

The dates of application were:—(i) "green flower," April 13; (ii) "pink bud," April 21; (iii) "petal fall," May 16; and (iv) "second post-blossom," June 5.

The sprays were applied from a hand-power "Demon" pump through a lance fitted with a medium-sized nozzle, and the same operator* manipulated the lance throughout the trial. Excellent spraying weather was experienced on all occasions.

Although in the previous year a good control of Scab was obtained, especially on the fruit, a few pustules of this fungus were present on the young wood in the spring of 1933.

Scab colonies were first observed on leaves of the unsprayed trees on May 17, the first record of Scab in the

* Mr. L. Fisher, whose careful work the writer desires to acknowledge.

APPLE SCAB SPRAYING EXPERIMENTS

Wisbech district having been on an unknown variety on May 8.

The summer-weather conditions continued to be very hot and dry, and the disease made little headway. Further, the fruit matured early, and the infection period was shortened.

The fruit was gathered on July 12, 20, and 29, and carefully examined and graded for Scab into four classes: (a) entirely free, (b) "pin spot," (c) "bad" (total Scab colonies more than the size of a threepenny piece and under the size of a shilling), and (d) "bag," with the following results:—

	Scab: Percentage Number of Fruits	Number of Apples	Weight of Crop (lb.)
Plot 1	0.0 1 apple with 1 "pin spot" of $\frac{1}{8}$ in. diameter	1,258	240
„ 2	0.6 "Pin spot"	1,450	279
„ 3	10.9 "Pin spot" with 4 apples "bad" 2 apples "bag"	1,219	230
„ 4	3.7 "Pin spot" with 2 apples "bad" 1 apple "bag"	1,378	294

While the incidence of Scab on the unsprayed plot was very small owing to the dry weather, it should be remembered that spraying operations must be regarded as an insurance policy, for at the time of the "green flower" stage the fruit grower has no knowledge whatever of the weather likely to occur in the ensuing months.

The differences between the amount of Scab on Plot 2 (two pre- and one post-blossom applications) and Plot 4 (one pre- and two post-blossom applications), and again between Plot 4 and Plot 1 (two pre- and two post-blossom applications) show that, even in a dry season, when a grower might be tempted to let the extra pre-blossom application slide, the best insurance policy in the Wisbech area is the one that includes the application at the "green flower" stage.

Had wet weather followed the blossoming period, the differences obtained between the plot receiving the one

APPLE SCAB SPRAYING EXPERIMENTS

pre-blossom and the plots receiving the two pre-blossom sprays would have been much greater, for the surface spread of the fungal colonies would probably have followed the law of compound interest.*

From these Wisbech spraying trials conducted in 1933 with lime-sulphur, on the variety Emneth Early (Early Victoria), it may be concluded that, even in a year when dry conditions prevail at the "green flower" and "pink bud" stages, the policy of including an application of lime-sulphur at the "green flower" stage is a perfectly sound one.

REFERENCES.

1. *Annals of Botany*, Vol. XXXVII, 1923: "A Study of the Growth in Culture of *Verticillium albo-atrum*, B. et Br."
2. *The Journal of Pomology*, Vol. XI, 1933, p. 185.

* H. Chaudhuri¹ has shown this to be the case with colonies of the fungus *Verticillium albo-atrum* growing on solid media.

A NORTHUMBERLAND HILL FARM

H. CECIL PAWSON,

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General Description.—The holding of Newbiggen, near Blanchland, Northumberland, farmed by Mr. J. Stephenson, J.P., not only affords an excellent example of good management, but provides an interesting illustration of the value and need of research in connexion with this extensive type of farming. The area of the holding is 1,470 acres, 970 acres being hill grazing and 500 acres enclosed fields. On farms of this type, the amount of land enclosed from the hill for hay and pasture grazing varies considerably; in some instances it consists of only a few acres near each shepherd's house. Around the main steading of Newbiggen are 330 acres, whilst, $2\frac{3}{4}$ miles across the hill, is the shepherd's cottage with 170 acres of enclosed land. Some years ago, Mr. Stephenson installed a telephone service between his own house and that of the shepherd, and this has proved of great value in organizing the shepherding. The hill area is worked in three "hefts," a "heft" being a distinct grazing area for a flock, sometimes fenced in, sometimes with a purely natural boundary. All the land at Newbiggen is over 1,000 ft. above sea-level, much of it running up to 1,400 ft. The labour employed consists of one shepherd, one cattleman, and a horseman, the last giving part assistance with the shepherding.

The Hill Flock.—About 420 Scotch Blackface ewes are run on the hill land, these being crossed with the Border Leicester to produce the popular north-country cross known as the Grayfaced, or, locally, as the Mule. The ewes, after breeding for three seasons, are drafted out to be sold as breeding ewes for the lowlands, and the ewe flock is replenished by Blackface ewe lambs bought at the autumn sales at Lanark. The purchased ewe lambs are kept at Newbiggen until October or November, according to the season, and are then sent down to the lowlands for wintering, returning to Newbiggen at the beginning of April. The cost of this wintering has been about 4*d.* per head per week, which includes an allowance of hay whenever necessary owing to wintry conditions. Last winter, the cost was only

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2½d. per head. Great importance is attached to the good start given to the ewe lambs by this better keep of the first winter, and it is the firm belief that, without it, the effective life or wearing capacity of the ewe in the hill flock is reduced.* The Border Leicester rams used are generally of the blue-faced hardy type; these, if good rams of this type are available, being preferred for the hill flock to the better-known and more widely distributed white-faced Border Leicester. The average price paid by Mr. Stephenson, during the last eleven years, for his rams purchased as shearlings has been £12 10s., the average effective life is three seasons, and the selling-off price as fat about £1 10s. Shearlings are used, as younger rams will not stand the hill conditions; and 45 ewes are allotted to each ram. The income from wool on a sheep hill farm used to be reckoned as covering the rent, but this is now a thing of the past. Mr. Stephenson has realized as much as 1s. 6d. lb. for the Blackface wool, whereas last year the price was only 4d. A few pence per lb. make a considerable difference to the income of a sheep farm. From the gray-faced lambs, bred on the hill as described, a selection is made of the females for subsequent use for breeding on the lower, enclosed land at Newbiggen. The remainder of the hill lambs are sold from September to the end of November for feeding and breeding purposes.

Stocking of Enclosed Land.—Wonderful improvement has been effected on this portion of the farm as a result of systematic treatment with basic slag and mineral phosphates. Before this treatment, the stock carried on the enclosed land at Newbiggen consisted of 80 Blackface ewes crossed with the Border Leicester, yielding, on an average, 100 gray-faced lambs. The total number of cattle carried was 70; in only one field was an attempt made to fatten, and this was only possible by means of a generous use of purchased concentrates. The majority of the cattle stock were growing stores. As a result of phosphate treatment, this land now carries 125 cattle, chiefly Irish, mainly spring-

* "It is also true to say that, without the almost universal custom of wintering the ewe hogs on lowland arable pasture, the breed characteristics of size and early maturity could not be maintained. Should wintering become more expensive or less readily procured, it is certain that many Blackface stocks on the higher and poorer grazing would degenerate, in size, prolificacy and early maturity, to a much smaller and goat-like sheep in biological harmony with its particular grazing area." Dr. Frazer, writing, in *The Scottish Journal of Agriculture*, April, 1933, on "Some Economic Aspects of the Scottish Sheep Industry."

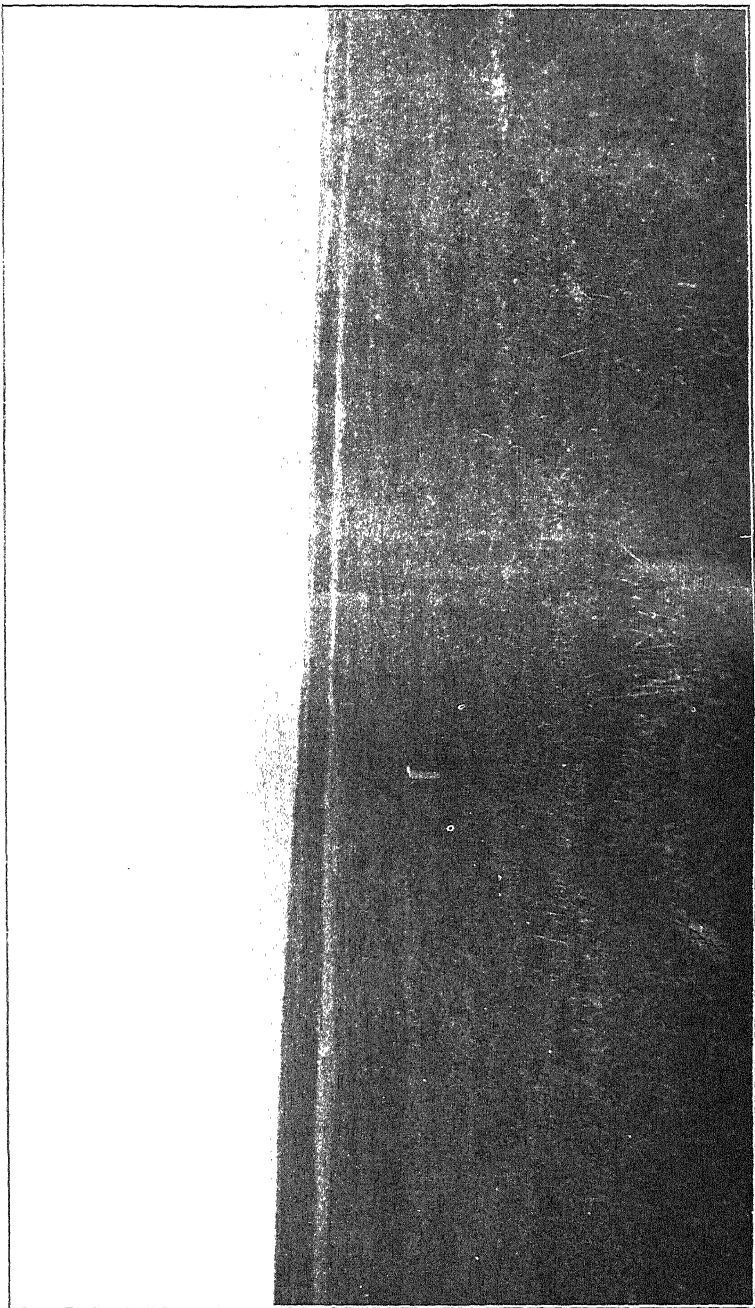


Photo: H. Cecil Parsons.

FIG. 1.—The hill on which heather plots are situated.

To face page 810.



FIG. 2.—Example of improved grazing on enclosed land where Irish cattle are fattened.

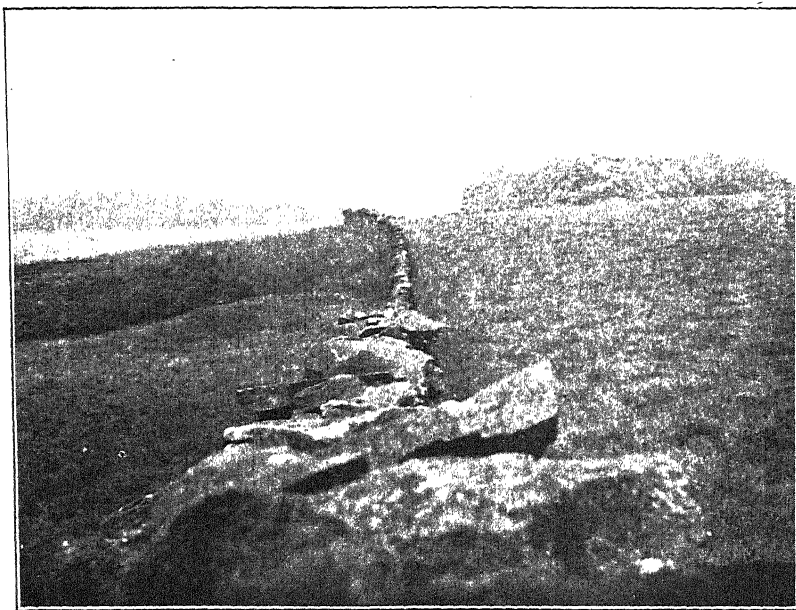


FIG. 3.—View of the same field, showing comparison with adjoining unimproved hill grazing.

Photos : H. Cecil Pawson.

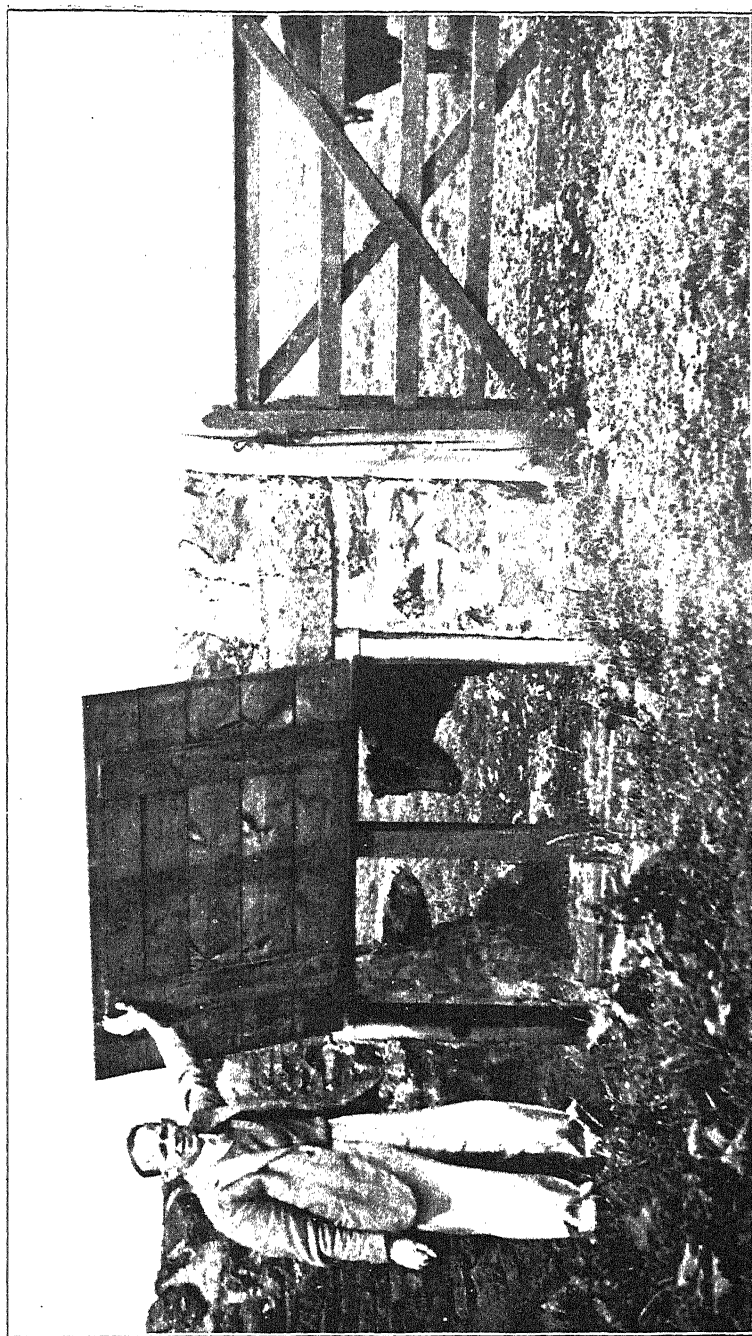


FIG. 4.—Hatchway arrangement, permitting sheep to graze over a wide range but preventing the passage of cattle.
Photo: H. Cecil Parson.



FIG. 5.—Border Leicester rams used to cross with Scotch Blackface, producing Gray-faced or Mule sheep.

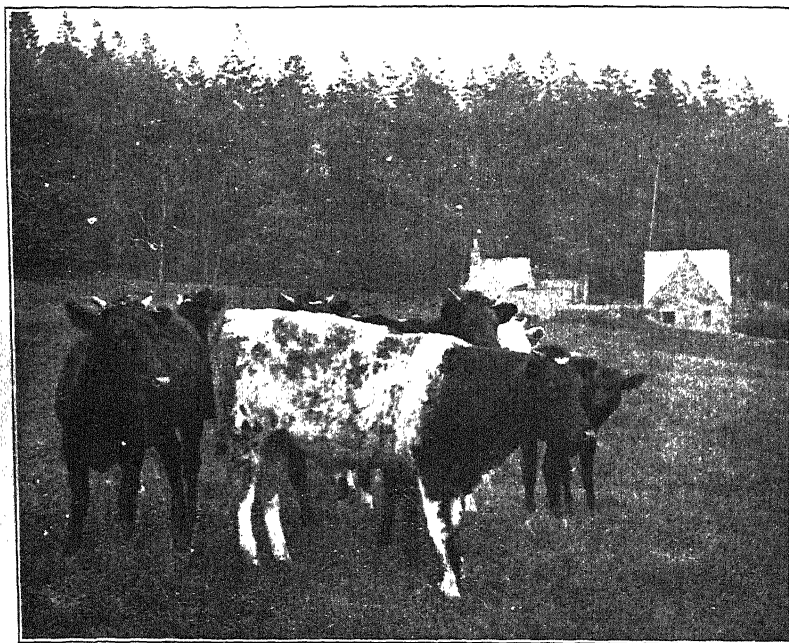


FIG. 6.—Home-bred Shorthorn heifers to be used for breeding purposes.

Photos: H. Cecil Parson.

A NORTHUMBERLAND HILL FARM

purchased at centres like Carlisle, which are subsequently sold off as fat cattle during summer and autumn, having received no supplementary feed. Owing to the disastrous returns from summer feeding in recent years, Mr. Stephenson, like many others, is giving more attention to the breeding and rearing of store cattle so as to be less dependent on purchased grown stock. In addition to the cattle, 120 gray-faced ewes (obtained from the hill breeding as mentioned earlier) are maintained, and these, crossed with Down rams, yield about 192 lambs. Twenty-five gray-faced ewe hogs are also carried on this enclosed land to be brought on for stock purposes. Mr. Stephenson favours, for this lower flock, the crossed Suffolk-Leicester ram as producing rather better feeding lambs than the pure Suffolk. No attempt is made to get the lambs fat early by the use of concentrates. They are not sold until September, and then usually on a dead-weight basis at Newcastle-upon-Tyne. The gray-faced ewes are drafted out after four crops of lambs and disposed of as breeding ewes.

Improvement of Enclosed Land.—Bearing in mind the altitude, or situation of the land, and noting the changes in stocking mentioned in both numbers and type of stock, the improvement effected is a striking example of the application of the results obtained at the Northumberland County Experiment Station, Cockle Park. Other advantages that attend the systematic treatment with phosphates are given by Mr. Stephenson as follows:—(a) a valuable early bite, always earlier, whatever the reason on the treated fields; (b) earlier meadows and better quality hay; (c) greater resistance to drought; and (d) a choice of markets (fat or store), not possible when stock can be drawn only from high-lying pastures in their unimproved condition.

It should be noted that all possible measures have been taken to back up the manurial treatment with good grazing management. Phosphates, by stimulating clover, have encouraged closer grazing, but, by adequate mixed stocking and care in the management, the close, even grazing resulting has in turn encouraged the spread of the clover and the development of better-quality grazing plants. In this connexion, the illustration (Fig. 3) of the special gates between the grass fields, which permit sheep, but not cattle, to pass through, is of interest. Grass sheep do better with a wide range, and by means of this trap door,

A NORTHUMBERLAND HILL FARM

which can be fastened back, and is sometimes fitted near the ordinary gate (as shown) or in the lower half of the stone dyke, the various fields can be fully stocked with cattle while the sheep are allowed the run of two or more fields. Better quality hay from the meadows is now more usual than formerly, partly owing to the adoption of the policy—now more common even on hill farms in the north—of earlier cutting. It remains to be added that the phosphate treatment has consisted of the usual Cockle Park recommendation, namely, 200 lb. phosphoric acid per acre as a first dressing, and half that quantity once every three years.

Diet of the Hill Ewe.—Feeding standards are available for most classes of live stock, including lowland sheep, but none is available for hill sheep. The subject is one that presents difficulties, for there is considerable variation in the grazing available for hill ewes. Grazings of this hill type in Northumberland are composed mainly of heather, or mainly of herbage on what is called white land, the latter growing various grasses, chiefly bent. The ideal is a mixture of heather and white land grasses, whilst for the spring period a proportion of draw moss (Cotton grass) is held in high esteem. Many of the hills suffer from inefficient drainage, and, especially in difficult financial times like the present, the cleaning and cutting of the open drains adopted is an operation apt to be neglected. As in the lowlands, it is possible to overdrain, and this applies particularly to moss flows from which the draw moss is obtained. It is considered that this particular species, brief though its valuable feeding-period may be, is far more useful than anything ever likely to grow in its place after drainage. Draining, fencing, shepherding, securing the hay for winter feed, and burning, are the chief items of general management. Mr. Stephenson is a convinced believer in the regular burning of the heather, for the reason that old, strong heather is of no use to either sheep or bird. He is opposed to indiscriminate burning of large areas, but burns in patches of a few acres so that the sheep may graze upon heather of varying age as they fall from and rise to the hill. It is most important, when burning is practised, to ensure a thorough burning.

As heather (*Calluna vulgaris*) forms so large a part of the diet of a hill ewe, an investigation was begun last year

A NORTHUMBERLAND HILL FARM

on the nutritive value of this plant, Mr. Stephenson giving facilities for making possible observations on the heather of known different ages since burning. With the collaboration of Mr. B. Thomas, M.Sc., A.I.C., Advisory Chemist, Armstrong College, a series of plots, marked off in 1932, have been sampled at different periods. A detailed account of the analytical work will be published shortly elsewhere, but some of the results are given on page 814. This investigation must be regarded as in the preliminary stage. Samples were taken during 1933 for analysis to determine seasonal variation. Another line of inquiry that it is hoped to pursue is the varying rate of recovery and growth of the heather after burning evident in heather growing on different formations. Summarizing my colleague's comments on analyses that are now more complete than those given in the table on p. 816, there is consistent decline in crude protein as the plant ages; a very high percentage of the total nitrogen is present as true protein, but, at its best, the protein content is lower than that of the herbage of Plot 6 (Tree Field, Cockle Park), the untreated land valued at 2s. 6d. an acre when the County Council took over Cockle Park in 1896, and which carries 1 sheep to the acre; the digestibility of the protein is comparatively low even in the youngest heather and falls as the plant ages; the oil content increases steadily with age, and is always substantially higher than in grass; the ash is low, and substantially lower than in the Tree Field, Cockle Park, samples; whilst the fibre content does not differ appreciably from that of pasture grass. It would seem that the sheep are more likely to suffer from phosphate deficiency than from a shortage of lime.

A preliminary analysis of samples of draw moss, taken this year, and made when the plant had reached the stage at which the sheep appear to appreciate it most, and of that part of the plant selected by the sheep, reveals the protein content to be 11.96 per cent., and the ash content 4.48 per cent. In Mr. Stephenson's opinion, a good supply of draw moss encourages the growth of a better fleece. It is probable that much of its value is due to it being available in early spring. With more complete analyses, giving seasonal variation in this and other hill plants, a better understanding of its value will be possible. There can be no doubt as to the high value that sheep farmers attach to it for assisting to obtain and maintain good condition in the ewes.

A NORTHUMBERLAND HILL FARM

Supplementary Food for Hill Ewes.—The only food, supplementary to the grazing, supplied in the ordinary way to the ewes on the hill is hay obtained from the enclosed land. Hay is put out only in the latter part of the winter, unless severe weather necessitates an earlier start. An allowance of 1 lb. or less per head per day is deemed sufficient unless the sheep are completely barred from the ground. Hay is often not supplied until February or March, and, especially when supplies are likely to be short (not an unusual occurrence), it is better to defer commencing the hay allowance than to finish haying too early in spring. To quote Mr. Stephenson, "it is the last handful of hay rather than the first that matters most." An analysis of the hay from enclosed land fed last season to the ewes grazing on the heft on which the heather plots are situated is as follows:—

	<i>Percentage of Dry Matter.</i>
Protein	9.54
Oil	2.94
Carbohydrates	47.43
Fibre	33.71
Ash	6.38
	<hr/>
	100.00
Lime (CaO)	0.62
Phosphoric Acid (P_2O_5)	0.48

According to my colleague, Mr. Thomas, this is of low lime content by comparison with other hay analyses. There are other indications that lime would be beneficial on some of the hay land at Newbiggen, an observation that applies to the enclosed land on many hill farms.

The question that emerges concerns the desirability or otherwise of supplying a more generous supplementary ration than hay to the hill ewes, especially in the later stages of pregnancy. To go back to the beginning of the shepherd's year, there can be no doubt that if, before the ewes are put to the ram, they were flushed by better grazing or richer diet of some kind, i.e., before being tupped in November, and also if tupped in small lots on lower ground instead of turning the rams on the hill, a much higher lambing percentage* would be obtained. The hill farmer, however, does not want twins, the argument of halving the cost of rearing a lamb by this increase in output not

* The lamb crop for Great Britain as cited by Professor White, and calculated from numbers on the farms on June 4, is only about 102 per cent., i.e., almost exactly one lamb from one ewe.

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appealing with the same force as in the lowlands where conditions are so different. A single lamb well done is more useful and valuable on the hill than two indifferently-reared lambs. It should be noted, however, that in some seasons, and on some hill farms in most seasons, a good start for single lambs is not easy to obtain, and losses in lambs and ewes occur owing to poor condition of the ewes at lambing time. In short, the milk flow of the ewe is the determining factor.

It may well be argued, therefore, that some "feeding for milk" might be worth while even for hill ewes, and that by better preparation for lambing more and better thriving lambs might be obtained. There is, also, the question of mineral matter to be kept in mind. The change-over from wether production to the sale of lambs means that increasingly larger amounts of protein and mineral matter are being demanded from the hill grazings throughout the country. Newbiggen is a sound, healthy sheep farm, as is evidenced by the low death rate, small trouble from disease, and the general condition of the flock. It is interesting to note here, however, that in Mr. Stephenson's judgment there is not a hill farm in his district that, looking back over a period of 20 years, carries a sheep stock as robust as in earlier years. This seems to apply to considerable areas in Great Britain.* Sheep may appear as healthy on many farms as in earlier years, and yet are often poorer in condition.

Early in 1931, 100 hill ewes, one in hirsels, at Newbiggen were found to be in poor condition. The weather being against their making a natural recovery, it was decided to give them $\frac{1}{2}$ lb. per head per day of broken maize, and this was continued until lambing time. The condition of the ewes was markedly improved and the lambs born were stronger than those from ewes on hay alone, and no loss was experienced in the ewes either before or after lambing. The cost of the extra food was not great, for at that time, with maize at £5 a ton, $\frac{1}{2}$ lb. per head per day for, say 12 weeks was less than 2s. Maize is a useful food for the particular conditions, and there is a consensus of opinion that

* "In Scotland the sheep population on the hill grazings, which amount to nearly half the whole of the hill area of Scotland, has shown a progressive decline in the last 50 years, and is to-day 22 per cent. less than in 1880." Economic Advisory Council, Committee on the Mineral Content of Natural Pastures, Seventh Report, 1932. This report gives an interesting account of studies being made on the influence of diet on immunity from disease in hill sheep at Garrochoran, a sheep farm in Argyllshire.

A NORTHUMBERLAND HILL FARM

the sheep miss this food less than any other when the ration is discontinued. On the other hand, where mineral deficiency is suspected, maize leaves much to be desired and would need supplementing with minerals. The whole question, however, is one in need of much fuller investigation. For one thing, it is doubtful whether the ewes thrive as well in the summer following hand-feeding as do those brought through on hay alone. The economics of supplementary feeding on hill farms must receive also adequate attention for conditions where rearing is extensive rather than intensive. Mr. Stephenson's present opinion is that, if the ewes are really thin, it is better to feed corn and save loss; but, if they can reasonably pull through on hay alone, this method approaches more nearly to the ideal. The study of the diet of the hill ewe, however, is a somewhat neglected one, and it is hoped that investigations, such as are proceeding under the direction of the Rowett Institute, and work of the kind, the preliminary stage of which has been described in this article, may provide information useful to hill farmers.

NOTE.—The writer's "Sheep Breeding in Northumberland," in the issue of this JOURNAL for March, 1930, p. 1152, gives descriptions of the breeds and crosses referred to in the present article.

ANALYSES OF HEATHER AND MONTH-OLD GRASS.

Plots from which the accompanying specimens came were sampled in August, 1932, and the growth of that season showed the following analyses:

Samples of month-old grass taken on the same day from Plot 6 (untreated) and Plot 4 (5 cwt. per acre basic slag since 1897) of Tree Field, Cockle Park. Analysed as follows:

<u>Age of Heather.</u>	<u>Per cent. of soil-free dry matter.</u>						
	2 years.	4 years.	6 years.	8 years.	Aged.	Plot 6.	Plot 4.
Ether Extract	3'06	4'30	4'65	5'05	5'25	1'73	2'47
Crude Protein	11'89	8'56	7'39	6'95	6'91	12'49	16'96
Fibre ...	22'21	21'67	21'49	20'42	21'12	24'39	22'65
*Ash ...	4'51	3'26	3'72	3'08	3'14	4'73	6'77
*including							
Phosphoric Acid (P_2O_5)	·492	·216	·257	·216	·227	·358	·917
Lime (CaO)	·918	·470	·604	·554	·694	·625	1'008

The figures given are of the analyses made of those portions of the heather which, on observation, it is concluded are grazed by the sheep.

SMALL POULTRY HOLDINGS IN LANCASHIRE

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Ministry of Agriculture and Fisheries.

THE steady growth of the poultry industry in England has been a striking feature of agricultural development since the War. Lancashire occupies a prominent position, for it has three times as many fowls per acre as any other county, and its poultry population showed a small increase again this year.

From the points of view of climate and soil, Lancashire is not, according to the ordinarily accepted standards, particularly suitable for poultry keeping. There are, however, densely populated districts in the county that form large markets for poultry produce, and whilst there is no evidence to show that prices are better here than in the south, these large markets are undoubtedly an advantage to Lancashire poultry keepers. Further, Lancashire men have a natural flair for fur and feather, and when times are bad and mills close down, such alternative employment possesses obvious attractions.

The creation of poultry holdings by the County Council has proceeded on orderly lines, and the Small Holdings Committee, under the chairmanship of Sir Thomas Rosbotham, M.P., is to be congratulated on the success that it is achieving in this method of land colonization. The rate of progress has depended to a very considerable extent on the success or otherwise in finding suitable land that has come on the market at a reasonable figure. To avoid the cost of road-making and other expensive development work, the land to be purchased must have a fairly considerable proportion of road frontage with, preferably, a water service. It must also be within reasonable distance of an urban area, not only to provide a market, but in order to ease the change-over of the settlers from an urban to a rural life. Such properties are not easy to find, and so the progress cannot be very rapid.

When a farm suitable for subdivision has been acquired, the next step is to lay it out as economically as possible. The unit aimed at for a poultry farm is from 3 to 5 acres; it is found that a smaller area than this will not

SMALL POULTRY HOLDINGS IN LANCASHIRE

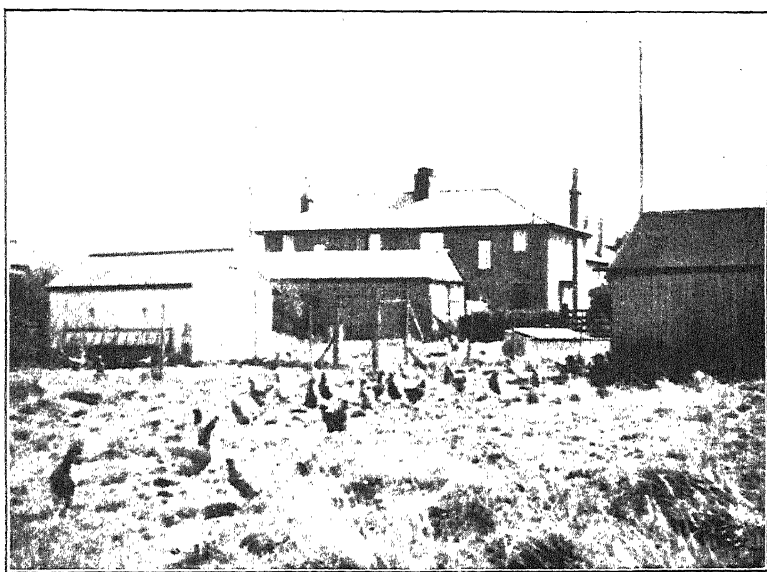
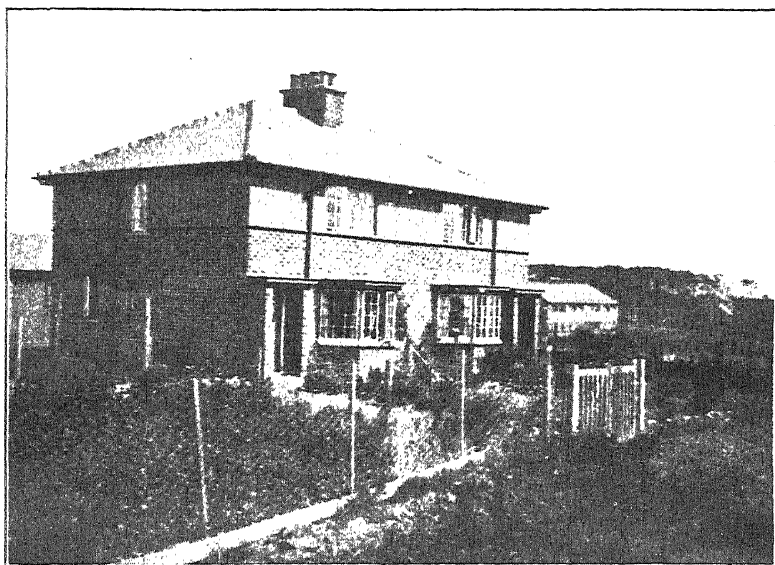
carry enough stock to enable a livelihood to be earned, while a larger area means that, in the early years, the occupier has unused acres from which he receives no adequate return for the rent he has to pay. It often happens that there is a proportion of back land (and perhaps a farm homestead) which it would be uneconomic to develop as poultry farms, and this is generally adapted and let as a small dairy holding. Such a scheme works very well, as the other small holders become consumers of the tenant's dairy produce, and are able to borrow a horse when occasion requires. Moreover, private development almost invariably follows the County Council's formation of small holdings, and in this way the tenant of the dairy farm has an opportunity to work up a remunerative milk round.

On each holding, a comfortable 3-bedroomed cottage is erected, with a small brick-built store for incubator, etc. The cottage, with 3 to 5 acres of land, is let for between £27 and £40 per annum according to the quality of the land and its situation. Immediately it becomes known that an estate is being subdivided, applications are received in quantity, and one of the most difficult tasks the Committee have to face is the selection of the tenants. Farm labourers, cotton operatives, miners, mechanics and railwaymen are a few of the many types who have been successful on County Council poultry farms. In one instance, the selected tenant had been drawing unemployment benefit for over two years; but, even where a settler was not previously unemployed, his withdrawal from the labour market has created a vacancy for someone else to fill.

It might be thought that amid such a heterogeneous collection there would be a high proportion of failures, but this is not so; the number of tenants of County Council poultry farms who have "gone wrong" financially is less than 8 per cent., and the amount of rent outstanding is negligible. On the other hand, some remarkable instances of tenants who have "made good" could be quoted, and two examples may here be put on record:—

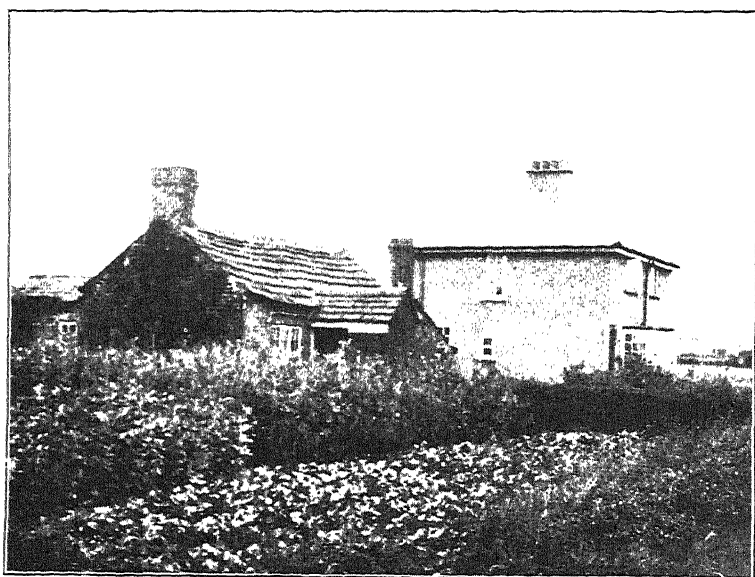
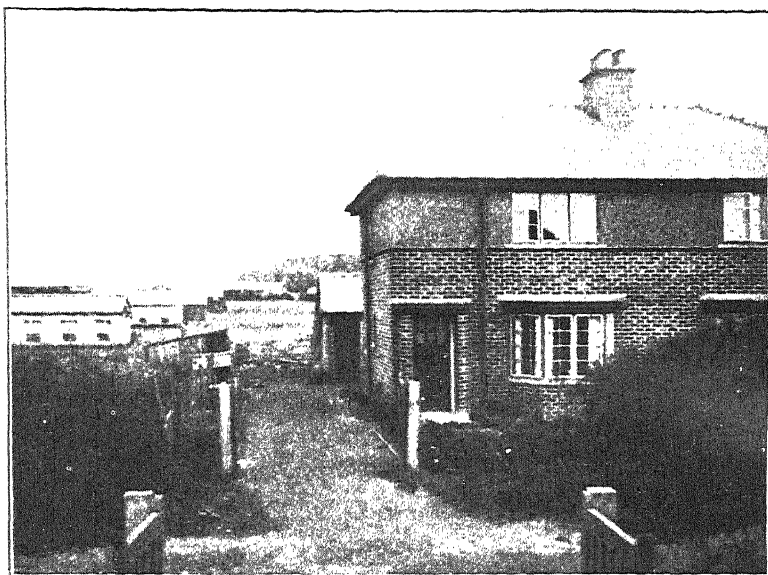
Mr. A. took a small holding five years ago and commenced operations with 650 fowls and a debt of £100. At the time of writing, the number of his poultry is doubled, and he has, in addition, 9 cattle and 23 pigs. Apart from farming capital, he has £800 invested or in the bank. The holding provides full-time employment for himself and his son.

Mr. B. was a "tackler" in a cotton mill until 1931, and had—to use his own expression—"never as much as kept a hen in a back yard until he was lucky enough to get a chance of a small holding."



FIGS. 1 AND 2.—Typical Cottages on Lancashire County Council Poultry Holdings.

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FIGS. 3 AND 4.—1932 Cottages on Lancashire County Council Poultry Holdings. The 1832 hovel in the foreground of the lower picture has been demolished since the County Council purchased the property.

SMALL POULTRY HOLDINGS IN LANCASHIRE

Within six months, he was earning a living and building up what is now a successful business. His is a striking instance of adaptability.

In some instances the artisan from the towns turns out to be at least as good a settler as the countryman born and bred; the town dweller may have benefited by contact with a larger variety of his fellows, and he is likely to take up the new work with an open and receptive mind—ready and anxious to make every use of the suggestions and discoveries of workers on the scientific side of the industry. For instance, the County Council smallholders were quick to adopt the night feeding of laying stock, inoculation against Fowl Pox, tests for B.W.D. and other recent advances that research has placed at their disposal. This open-mindedness is evidenced by the number who have erected glasshouses on their holdings since the institution of the import duties. As an Irishman put it: "We don't intend to have all our eggs in one basket; sure some of them will be tomatoes!" Few of them trap-nest their stock, but the general standard of their birds is up to the average, and in many instances above it.

As a result of the fall in building costs and of the cheapening of money, it is now possible to create holdings in the 3-5 acre class without any financial loss, and this has encouraged the Council to push ahead with the creation of additional holdings.

The sales organization in Lancashire leaves room for improvement, more particularly in regard to the sale of table poultry, for thousands of half-grown cockerels are sold every year at an unremunerative price because it does not pay to run them on. It is hoped that the canning industry may effect an improvement in this direction. A group of poultry farmers at Burnley has attempted to tackle the anomaly of buying retail and selling wholesale. They formed a co-operative society some years ago for the bulk purchase of their feeding stuffs, etc., while a grading and packing station now handles their eggs, labels them with the National Mark and despatches them to London.

THE WORKING OF THE SEEDS ACT, 1920, IN THE SEASON 1932-33

THE Seeds Act, 1920, has been in operation long enough for the agricultural community to be fairly familiar with its general purport. Briefly, the basic principle of the Act is the requirement that the seller shall give the purchaser a written statement containing the particulars that will enable a reasonably close estimate to be made of the probable value of the goods offered. Failure to deliver the prescribed particulars, or the delivery of false particulars renders the seller liable to prosecution. The sale of inferior seed is not prohibited, but its qualities must be described.

Happily it may be said that the Seed Trade as a whole appreciates the existence of the Act, and realizes the protection offered to the reputable merchant against unscrupulous competition. The benefits to purchasers are equally important; in particular, a statutory declaration of purity and germination offers a guarantee against the very considerable loss of time and money that may occur in an endeavour to grow a crop from dead or worthless seed.

The 1932-33 seed season may be regarded as one of the most satisfactory since the passing of the Act. Seeds of exceptionally good quality were available, and where sold as being above the "authorized minimum percentages of germination" they generally proved to be well in excess of these minima.

The statistical analysis that is made later in this report under the heading "Control Sampling," should not be regarded as giving a true picture of the state of the seed supply in this country. Inspectors have by now formed a reasonably accurate estimate of the trade and traders within their areas, and it follows that samples of unquestionably good seeds are comparatively seldom taken. On the other hand, the attention of Inspectors is primarily engaged with "suspect" seeds or those from unknown sources; and official samples may well be expected to bring to light a somewhat high proportion of discrepancies. Further, as the need for economy in expenditure has led to limitation in the number of visits and control samples taken, there has been additional reason to restrict sampling mainly to cases

THE WORKING OF THE SEEDS ACT

in which infringements of the provisions of the Act may be suspected, or to seed that does not appear to be in conformity with the declared particulars. Generally speaking, therefore, the quality of the seed on sale during the season may safely be assumed to be considerably higher than might be inferred solely from an examination of the results of official sampling.

It appears to be a coincidence that during the past season the same serious but unusual contravention of the Act should be discovered on four occasions. All seeds to which the Act applies, other than garden seeds, must, except for sales taking place during the months of August or September, be accompanied by a declaration of certain particulars ascertained from a test made during the seed season (August to July) in which the seed is being sold; and the test must be one carried out, either at one of the Official Seed Testing Stations, or at a testing station licensed by the Minister. Inquiries into the four cases in question elicited from the firms concerned admissions that they had made declarations based on unlicensed tests of "yearling" seed. This procedure is directly contrary to the provisions of Section 2 of the Act, and although, after full consideration of all the circumstances, it was decided not to institute legal proceedings in the cases mentioned, the Ministry must perforce take more severe action if offences of this nature are found to recur. The Seeds Act has now been in force for 12 years, and merchants can have no excuse for ignorance regarding this important requirement.

Licensed Seed-Testing Stations.—The private stations mentioned above, which are specially licensed by the Minister to conduct tests on which declarations under the Act may, for the purposes of the licensee's own purchases and sales, be based, are mainly owned by the larger seed firms, and thus form a most important channel through which a very large part of the agriculturists of the country obtain their seed supplies. The operation of these stations is therefore of great moment to those responsible for the administration of the Act. There are at present 79 such stations, and all are required to retain a duplicate portion and a record of each sample tested. Periodic visits are paid to the stations, and a selection of the "Reserved Portions" are taken for check testing at the Official Seed Testing Station, Cambridge. "Referee" samples, which

THE WORKING OF THE SEEDS ACT

are all drawn from the same bulk, and are thus as nearly as possible alike, are sent out to the stations, usually twice in a year, and the results of the private tests on them are examined and compared with those of the Official Station for similar samples. By these and other means, close watch is kept on the activities and accuracy of the private stations; and discrepancies of any importance are inquired into, in order to discover the cause. Every effort is made to ensure uniformity of methods and of results.

The work of the private stations during 1932-33 must be regarded as better than that of any previous season. Several firms have now had the same analyst for a number of years, and the analysts have gained considerable experience, and have become skilful at mastering the seasonal difficulties that they encounter.

Visits to Seedsmen.—It has been mentioned that, from motives of economy, a decrease in the number of routine visits to sellers was decided upon for the 1932-33 season; and during the year some 4,279 calls were made by Inspectors. These visits included 552 to sellers who were new to the trade or who had not previously been visited. The effect of diminished activities in visiting and sampling must, of course, be watched carefully; but the experience of the season under review does not suggest any falling away from the satisfactory position achieved by the seed trade over the country as a whole. Realizing the requirements of the Act as to the testing of "carry over" stocks, many seedsmen now order only small quantities at a time; in fact, some of the smaller firms have ceased to carry stocks of agricultural seeds, and merely pass on orders to the larger houses. Increasing quantities of seeds are being distributed in packeted form, both by small traders and multiple stores, and most wholesalers make arrangements for the packets to be sent out on a "sale or return" basis. The tendency for the trade to converge into the hands of the bigger "whole-time" firms appears, therefore, to be continuing.

With seedsmen proper little difficulty is experienced in the main in securing ready compliance with the requirements of the Act, but it is still necessary to expend considerable time and effort on firms whose main trade lies elsewhere and who only take up the sale of seeds temporarily, as a side-line.

THE WORKING OF THE SEEDS ACT

Visits to Farmers.—Efforts have not been relaxed to bring home to farmers, not only the protection afforded by the Act to them as buyers, but also their obligations when they are in the position of sellers. To this end 1,110 visits to farmers have been paid during the season in connexion with Seeds Act matters; and Inspectors take every suitable opportunity when attending agricultural shows, meetings, lectures, etc., to explain the position of the farmer both as a buyer and as a seller of seeds.

Visits to seedsmen and the samples taken on their premises give information regarding the seed before it is sold; but it is clearly desirable that some check should be exercised over the seed that is actually received by the buyer. With this object in view, Inspectors have sought permission from farmers to draw samples from parcels of delivered seed, and these have been tested and the results compared with the declarations furnished by the sellers. The information obtained by this means has revealed a certain number of infringements, more particularly in respect of delay in supplying the statutory declarations, the omission of certain particulars from the declarations, and an unduly low germination percentage in the case of ingredients in some seed mixtures.

Buyers can do much to help to make the Act effective by insisting upon receiving from their suppliers, whether seedsmen or fellow farmers, the particulars to which they are entitled under the provisions of the Act.

Control Sampling.—Excluding samples of seed potatoes, 992 "control samples" were taken by Inspectors during the season to check the particulars declared on the sale of seeds. Of these, 346 were of grass and clover seeds, 113 of field seeds, 239 of "loose" garden seeds, 52 of cereals, 66 miscellaneous (mainly sugar-beet seed) and 176 of packeted seeds. The samples of packeted seeds showed 3 discrepancies in germination, or 1.7 per cent., and none in purity, while 5 cases called for attention as regards errors in or absence of declarations. Apart from packeted seeds it was necessary to investigate 72 cases, 43 being concerned with discrepancies in purity or germination, and 29 with omissions and errors in declarations. There were 2 purity discrepancies, both concerned with clover seed. The majority (35) of the 41 germination discrepancies were found among the grass and clover samples; most of these,

THE WORKING OF THE SEEDS ACT

however, were attributable either to the seed drying out or to loss of vitality in the interval between the test on which the seller's declaration was made and the test at the Official Station. The remaining germination discrepancies were made up of 1 field seed, and 5 garden seed samples. Eleven of the germination discrepancies were within 10 per cent. of the declared figure, 19 were over 10 per cent. but less than 15 per cent., and the remaining 11 showed a variation of more than 15 per cent. Considering non-packeted seeds as a whole, the figures show that 9 per cent. called for special attention—0.3 per cent. as regards purity, 5 per cent. as regards germination, and 3.7 per cent. because of omissions or errors in declarations.

In view of the subsidy to the beet-sugar industry, the Ministry has a special interest in the sugar-beet seed sent out to growers by the factories concerned. Control samples were taken during the season from each factory, and the results of the check tests were in all instances well above the minima of purity and germination guaranteed by the factories.

Seed Potatoes.—As with agricultural and garden seeds, the greatest difficulty in administering the Act is encountered with the casual seller who takes up or drops the sale of seed potatoes, according to the state of the market. Much time and trouble is expended in tracing these traders and explaining the requirements of the Act; but even so, it is obvious that many small transactions occur where the participants have either no knowledge of or no regard for the Act. The larger firms, both buyers and sellers, are well acquainted with the legal position, and it would appear that the extensive propaganda undertaken by the Ministry's officers in recent years has considerably reduced the number of irregular sales of seed potatoes at auctions.

During the season, 39 cases of alleged offences in connexion with the sale of seed potatoes were inquired into; 15 were in respect of misdescription of variety—3 being also concerned with other more technical offences; 13 as to size and dressing; and 6 where the statutory statement was incomplete or had not been supplied. In 5 instances investigations had to be abandoned as the essential documents were not available. Four of the cases of misdescription of variety, and 10 of those regarding size and dressing concerned Scottish sellers, and were accordingly forwarded

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to the Department of Agriculture for Scotland for action. A total of 17 control samples of seed potatoes was drawn during the year.

Prosecutions.—During the season, five prosecutions were instituted under the Seeds Act by the Ministry; four for offences relating to the sale of seed potatoes, and one in connexion with garden seeds. The first of these prosecutions concerned a false statement of the variety of some seed potatoes sold by a Newcastle firm that had imported them from Denmark. Although the case was dismissed under the Probation of Offenders Act, it was pointed out that the seller must in such circumstances be prepared to accept responsibility for the correctness of the description of the seed potatoes offered for sale. The next case was in connexion with a parcel of potatoes that were sold as Scotch seed by an Essex firm, but that were, in fact, of Irish origin. It was urged that a clerical mistake was the cause of the error, and this case, too, was dismissed under the Probation of Offenders Act, nominal costs being awarded to the Ministry. Proceedings were also taken against a Bedford seller regarding a false declaration of the germination of some parsnip seed that he was offering for sale. He was convicted, and fined £2 10s. An important case was successfully concluded against a Cambridgeshire potato merchant, who was charged with failure to supply particulars of Class, Variety, and Size and Dressing relating to two sales of seed potatoes. He pleaded "guilty" to the charges; and during the proceedings admitted that the potatoes were not "Scotch" as had been implied on sale. Fines totalling £10 were imposed for these offences and for others against the Wart Disease of Potatoes Order. Similar charges under the Act and Order were the subject of proceedings against a Yorkshire potato merchant. A conviction was also secured in this instance and fines totalling £4 were imposed. In addition, proceedings were taken on two occasions by the Scottish Authorities in respect of false statements of the Size and Dressing of seed potatoes originating in Scotland and sold to English farmers; fines of 10s. and £2 10s. were imposed.

Seed Analysts' Bulletin.—Two numbers of this Bulletin were issued by the Ministry during the season, the first (No. 21 of the series) in November, 1932, and the second

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in the following April. The results of the two sets of "Referee" samples sent out during the season were tabulated in full; and a report of the proceedings of the Ninth Conference of Seed Analysts was included in the form of an appendix. Among other articles forming the two numbers were:—"Comparison of Various Types of Sand in Regard to Their Suitability for testing Peas and Beans," a resumé of experiments carried out at Messrs. Sutton & Sons by Mr. C. H. Hunt; "Notes on the Identity of Certain Seeds of Bromegrass"; "Certified (English) Wild White Clover Seed"; "New Zealand Crop Certification Schemes"; "Seed Certification Schemes in England and Wales"; and notes on importation restrictions imposed by countries abroad.

Fees for Seed Testing.—No further alterations have been made in the fees chargeable by the Official Seed Testing Station, following the adjustments and reductions that were sanctioned as an experimental measure in the season 1931-32. Full particulars of these alterations were published in the March, 1932, issue of this JOURNAL (p. 1228), and they can also be obtained on application to the Ministry.

General.—Copies of the Seeds Act, 1920 (price 3*d.* net); the Seeds (Amendment) Act, 1925 (1*d.* net); and the Seeds Regulations, 1922 (3*d.* net) may be obtained either direct or through any bookseller, from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C.2. A convenient summary of the provisions of the Act and Regulations, showing also the fees chargeable for tests and the sizes of samples to be sent, may be obtained free of charge from the Offices of the Ministry, 10, Whitehall Place, London, S.W.1.

REPORT ON THE WORK OF THE EDUCATION AND RESEARCH DIVISION OF THE MINISTRY FOR THE YEAR 1931-32*

PART III—HORTICULTURE

THE horticultural work of the Ministry includes the administration of the Destructive Insects and Pests Acts, 1877 to 1927; the arrangements for the issue of the various "health certificates" required by the regulations of the importing countries to accompany agricultural and horticultural produce exported from this country; business connected with horticultural education and instruction in bee-keeping; the preparation and revision of bulletins and advisory leaflets on horticulture and allied subjects; the administration of the various schemes for the inspection and certification for purity of growing crops of potatoes, strawberry plants, bulbs and black currant bushes; the preparation and issue of monthly reports on the condition of horticultural crops and of forecasts of the probable yield of certain fruits; and the business of the Minister's Horticultural Advisory Council.

Horticultural Education.—Any substantial developments of the educational work carried on by the horticultural staffs of Local Agricultural Education Authorities was precluded by the continued need for economy in the expenditure of public funds, which was also responsible for the reduction of the staff in certain counties. The chief feature of the year's work was the very marked increase in the demands for the services of the County Horticultural Officers, who were called upon to deal with requests for advice from growers who were adjusting their cropping in order to avail themselves of the opportunities presented by the alteration in the fiscal policy of the country. Another important feature was the propaganda carried on with the object of improving the standard of fruit production in the country. For many years past the Ministry has urged

* Part I of this Report, relating to "Research (including Local Investigation and Advisory Work)," appeared in the issue of this JOURNAL for October, 1933. Part II, dealing with "Agricultural Education," was published in the issue for November, 1933, and, with the present instalment, on "Horticulture," the Report is concluded.

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upon growers the necessity for the production of more high-grade fruit, and has emphasized the paramount importance of the thorough spraying of orchards in order that the proportion of blemished fruit may be reduced to the least possible dimensions. During the early part of 1932 meetings were arranged in co-operation with the National Farmers' Union and the County Education Authority at various centres in Kent. At these meetings the necessity for improvement in orchard hygiene was strongly impressed upon the growers present. Reports subsequently received show that these meetings led to most successful results, and that the amount of spraying carried out in the County during the season was greatly in excess of that done in previous years.

Reference was made in the last report to the series of bulletins on horticultural crops prepared by the technical officers of the Ministry. To the list given therein must be added bulletins on the cultivation of vegetables in frames, asparagus and commercial bulb production, which were issued during 1932. The large demand for these bulletins affords good evidence of the readiness of growers to take advantage of the opportunities afforded by the reduction of the quantity of produce imported into the country.

Horticultural Advisory Council.—The subjects discussed by the Council at the two meetings held during 1932 included tariffs on imported horticultural produce; the Colorado Beetle Order of 1931; the Importation of Raw Cherries Order, 1932; the Apple Capsid (Essex) Order, 1932; the arrangements for obtaining horticultural crop reports and estimates; the effect of economy "cuts" in connexion with grants to Horticultural Research Stations; and the application of National Mark schemes to all kinds of horticultural produce.

Inspection and Certification of Growing Crops.—

(a) *General.*—The schemes for the inspection and certification of growing crops of potatoes, strawberry plants, and black currant bushes were continued during the year. The inspections are carried out during the growing season by officers who have been specially trained in the identification of the varietal characteristics and disease symptoms of the crops with which they deal. At the close of the inspection season registers of the names and addresses of certificate

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holders are issued. Fees are charged for the services of the Inspectors, in order to render the service self-supporting.

(b) *Potatoes*.—Applications for the inspection of growing crops of potatoes had shown a heavy decrease in 1930 following on the unsatisfactory season of 1929. A slightly larger acreage was inspected in 1931, and this improvement was followed by a marked recovery in 1932, the total area examined in that year being nearly 2,200 acres larger than in 1930.

Certificates are issued in respect of stocks that are found by the Inspectors to contain not more than 0.5 per cent. of "rogues." Of the total of 7,000 acres examined in 1932 (4,000 acres of immune varieties and 3,000 acres of susceptibles), 6,000 acres were found to reach the required standard of purity and were duly certified. As in previous years, the major portion of the acreage certified is represented by the immune varieties "Majestic," "Kerr's Pink," "Great Scot" and "Arran Banner," and the susceptibles "King Edward VII," "Eclipse" and "Ninetyfold." In addition, the Inspectors dealt with small areas of no fewer than 63 immune varieties.

(c) *Strawberry Plants*.—Under this scheme, stocks of strawberry plants from which it is proposed to take runners for sale are inspected with the object of certifying them if they are found to be true to type and reasonably free from rogues. The certificates do not imply that the stocks are free from disease, but no certificate is granted in respect of a stock that is obviously unhealthy or lacking in vigour at the time of inspection.

Applications were received from 80 growers for the inspection of 162.2 acres of plants. This area was smaller than that of 1931 and of 1930, when the number of applications was 111 and 141, and the acreage 217.5 and 395 respectively. As in previous years, more than half of the applications came from growers in the Wisbech area of the Isle of Ely, Lincs., and Norfolk, and the remainder mainly from Kent and Hampshire. Stocks that were certified in 1931 were inspected once only—in late July or early August: in all other cases two inspections were carried out, the first being made in June, during the flowering period.

It will be seen that "Oberschlesien," "Royal Sovereign" and "Sir Joseph Paxton" together accounted for over 85 per cent. of the acreage examined.

The number of stocks and the acreage of each variety inspected in the past three seasons were as follows:—

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Variety.	1930		1931		1932	
	No. of Stocks	Acre-age	No. of Stocks	Acre-age	No. of Stocks	Acre-age
Bedford Champion ...	45	38.9	20	8.5	3	0.6
Jucunda ...	14	5.7	4	4.4	1	0.5
Leader ...	13	5.3	9	2.2	2	0.4
Madame Kooi ...	21	12.3	10	3.7	7	2.7
Madame Lefebvre ...	42	31.7	13	5.4	13	5.1
Oberschlesien ...	31	30.1	57	63.5	48	57.8
Royal Sovereign ...	94	144.3	66	58.0	47	55.3
Sir Joseph Paxton ...	49	68.7	48	45.3	22	25.7
Stirling Castle ...	5	8.7	3	5.1	3	3.2
Tardive de Leopold ...	16	31.1	20	14.6	17	6.1
The Duke ...	10	6.4	8	3.4	9	4.1
The Laxton ...	17	11.8	10	3.4	3	0.7
	357	395.0	268	217.5	175	162.2

Of the 162.2 acres entered for inspection, 151.8 acres qualified for certification, representing over 93 per cent. of the total area. This figure compares favourably with 85 per cent. in 1931, 93 per cent. in 1930, and 89 per cent. in 1929.

(d) *Black Currant Bushes*.—Certificates for black currant bushes are issued for stocks believed to be true to type and apparently free from reversion at the time of inspection. The normal procedure with regard to nomenclature is to certify bushes as true to one of the four main group types, viz., (1) French Black, (2) Boskoop Giant, (3) Edina and (4) Baldwin, and to insert in brackets any varietal names given by the applicant. Some varieties, however, have not yet been classified in any of these groups, and in these instances the stocks are certified as true to variety.

The table below shows the number of bushes of each type inspected and certified during the past three seasons:—

Group	1930		1931		1932	
	In-spected.	Certi-fied	In-spected	Certi-fied	In-spected	Certi-fied
French Black ...	169,111	122,361	119,247	106,647	70,008	65,508
Boskoop Giant ...	53,564	45,214	58,166	51,416	32,770	32,420
Edina ...	30,385	20,655	25,692	25,342	18,798	16,798
Baldwin ...	78,023	75,873	72,999	65,299	80,230	78,980
Unclassified Varieties	66,087	61,087	102,698	101,148	79,698	74,698
	397,170	323,170	378,802	349,852	281,504	268,404

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The percentage of bushes certified (95) is the highest yet reached, and compares with 92 per cent. in 1931, 81 per cent. in 1930 and 88 per cent. in 1929. Some 3,000 bushes were refused certificates owing to the existence of reversion, and 3,500 bushes failed to qualify owing to lack of vigour.

(e) *Bulbs*.—During the past two or three years the “dry bulb” industry in this country has been steadily expanding. In order to assist growers who propose to lay down fresh stocks of bulbs it was decided to institute a scheme of inspection and certification, so that growers might be able to purchase stocks known to be vigorous and true to type. Details of the scheme were discussed and settled during the period under review. An account of its operation during the 1933 season will be given in the next report.

Certified Exports of Plants, Potatoes, etc.—(a) *General*.—The import regulations of most countries demand that consignments of plants, potatoes, etc., must be accompanied by some form of certificate involving an inspection either of the plants, etc., or of the premises from which they are consigned. The forms of certificates required by countries importing plants, etc., from Great Britain, differ in various details, but generally imply that each consignment is believed to be free from pests and diseases. The *Phylloxera* certificate prescribed by the regulations of some European countries implies that the premises whence the plants are consigned contain no vines that could come into contact with the exported material.

The examination of plant material intended for export is carried out by selected members of the Ministry's Inspectorate, normally on the premises of the grower or exporter, but small packages sent by parcel post, and consignments not exceeding 112 lb. in weight, may be examined at the offices of the Ministry.

(b) *Nursery Stock, etc.*—The following table shows the number of certificates issued in respect of consignments of nursery stock, etc., exported in each of the last four years, and the total value of such consignments:—

			<i>Phylloxera</i> <i>Certs.</i>	<i>Health</i> <i>Certs.</i>	<i>Value</i> £
1929	..	..	1,104	4,983	78,043
1930	..	..	1,292	4,385	68,250
1931	..	..	1,009	4,337	49,670
1932	..	..	761	4,130	33,348

EDUCATION AND RESEARCH REPORT.—III

Bulbs, principally narcissus, lily, iris and tulip, to the value of over £3,500, manetti stocks £2,000, and orchids £12,600, were included in the consignments certified for export during 1932.

The most valuable overseas market for English nursery stock, etc., during 1932 was the United States of America, for which consignments valued at approximately £11,100 were certified. Of the 74 other countries to which certified consignments were exported during the year, Canada, Sweden, Argentina, Japan, Brazil, New Zealand, Belgium, Australia and Denmark were the most important.

(c) *Potatoes*.—The following table gives details of the quantity and value of potatoes certified for export from England and Wales for each of the years 1929-1932:—

			<i>Tons.</i>	<i>£</i>
1929	..	..	58,715	280,015
1930	..	..	27,675	121,241
1931	..	..	25,949	147,882
1932	..	..	33,048	187,098

The quantity of potatoes certified for export during 1932 was appreciably greater than in the two previous years. Prices were slightly lower than in 1931, but compare favourably with previous seasons, £5 13s. per ton being the average in 1932, compared with £5 14s. in 1931, £4 7s. 6d. in 1930 and £4 15s. in 1929.

The principal country importing potatoes from England and Wales in 1932 was Spain, with a total of some 22,000 tons. Appreciable quantities were also shipped to Algiers, the Canary Islands, French Morocco, Italy, the Channel Islands and Portugal.

Destructive Insects and Pests Order of 1922.—This Order requires that certain categories of plants for propagation, as well as potatoes, onion and leek seed, and gooseberries imported into England and Wales shall be accompanied by official health certificates issued in the country of origin, and prohibits the distribution of uncertified consignments until they have been examined and passed by one of the Ministry's Inspectors.

The number of instances in which action under the Order has been necessary bears a very small proportion to the large quantity of imports; this fact indicates that the general improvement in the standard of health of the imported produce to which the regulations apply has been well maintained.

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Either as a result of the imposition of tariffs or of the economic depression, the number of health certificates received from all sources during 1932 showed a decrease of nearly 28 per cent. on the figures for the preceding year, the numbers being 40,291 and 55,823 respectively; the number of uncertified consignments dropped from 442 in 1931 to 317 in 1932.

Most of the uncertified consignments were found to be healthy and were released after examination. Examples are given in the following list of the action taken in cases where uncertified consignments were found to be unhealthy:—

Holland.—Tulips, daffodils and narcissus affected with Botrytis and Fusarium. The whole consignment (16 baskets) was re-exported.

Gladioli affected with Hard Rot. The diseased corms were destroyed.

Japan.—Miniature cherry trees infested with the Japanese Fruit Scale (*Diaspis pentagona*). The trees were destroyed.

Miniature cherry trees infested with scale insects, and dwarf pine tree infested with *Chermes*. The trees were suitably disinfected.

U.S.A.—Shrubs infested with gall insects. The shrubs were otherwise healthy and were released after the galls had been removed.

Carnations attacked by Red Spider. The plants were disinfected.

Spain.—Orange tree infested with scale insects. The tree was disinfected.

Chile.—A sample consignment of potatoes found to be infested with the Potato Moth. The consignment was destroyed.

The arrangements that had been in force during the past two years for the examination at various ports of certified consignments of imported plants, etc., were continued during the autumn and winter of 1932. The inspection of some 400 consignments of various kinds of plants and bulbs from different countries showed that the great majority were generally healthy and in good condition; in a few instances only was it found necessary to take action under the Order.

As in previous years, special attention has been given to certified consignments of potatoes from the Canary Islands, and, during the 1932 season, orders were given for the destruction or re-export of 9 consignments comprising 860 packages, by reason of the presence of tubers infested with the larvæ of the Potato Moth (*Phthorimaea operculella*). This pest is also prevalent in most of the countries bordering on the Mediterranean; some of these countries were

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anxious to obtain a footing for their early potatoes on the English market, but, unfortunately for the exporters concerned, they appear to have been unable to secure the freedom of their consignments from the Potato Moth, with the result that during the season of 1932 it was necessary to condemn the following shipments:—

Malta:	2 consignments	(277 packages).
Portugal:	3	„ (1,334 „).
Egypt:	10	„ (15,904 „).
Cyprus:	26	„ (19,965 „).

The facts were brought to the notice of the Governments concerned in order that action might be taken by them to prevent the export to this country of further consignments similarly infested.

The Trade Commissioner for Cyprus sought permission to explore the possibility of destroying the larvæ in the infested potatoes by means of fumigation, in order that the heavy loss entailed by the destruction or re-export of so many large consignments might be obviated. Permission was given for an experiment to be carried out under the supervision of officers of the Stored Products Research Department of the Imperial College of Science and of the Ministry on a barge containing some 90 tons of potatoes. These potatoes were submitted to fumigation by ethylene oxide for a period of not less than twenty-four hours; the bulk was carefully sampled by officers of the Stored Products Department and samples were taken independently by the Ministry's Inspectors. The examination of the samples showed that all moths and larvæ had been killed, and it was decided in this case to allow fumigation by this method as an alternative to destruction or re-export. The fumigation was carried out, and as thorough examination by the Ministry's Inspectors failed to reveal the presence of any living larvæ, the consignments were released. It is understood, however, that the results of the experiment were not regarded as satisfactory from the point of view of the merchants who undertook the sale of the fumigated consignments.

The question of the revision of this Order in the light of the experience gained during the past 10 years was considered during 1932, in consultation with the Department of Agriculture for Scotland and the Ministry of Agriculture for Northern Ireland, and the final results of these deliberations were embodied in the Importation of Plants Order of 1933 and the Destructive Insects and Pests Order of 1933.

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These Orders did not come into operation until July 15, 1933, and details of their requirements are accordingly deferred for a later report.

Destructive Insects and Pests (Amendment) Order of 1927.—No trace of the Chrysanthemum Midge (*Diarthronomyia hypogaea*) has been observed in this country since October 17, 1930. As stated in the last report, all restrictions under this Order were withdrawn in January, 1932.

Colorado Beetle Order of 1931.—The provisions of this Order and the reasons for its issue were fully dealt with in the last report (see this JOURNAL, November, 1932, pp. 744-5).

The Order became operative on March 15, 1932, since which date the entry of any potatoes grown in France has been entirely prohibited. Nursery stock and living plants are admitted only if they are officially certified not to have been grown within 200 kilometres of any place where the Colorado Beetle exists or has been known to exist, and between March 15 and October 14 in each year the admission of raw vegetables, including tomatoes, onions, aubergines and salads, is subject to the same restrictions.

Information published in the French *Journal Officiel* in February, 1933, showed that the Colorado Beetle continued to spread in France during 1932 and that outbreaks had occurred within 35 miles of St. Malo and 65 miles of Le Havre.

The steps taken to ensure that any appearance of the Colorado Beetle in this country should be promptly notified to the Ministry were outlined in the last report. As the result of the publicity campaign, numerous specimens of various insects were forwarded to the Ministry during 1932 from all parts of the country. None of these specimens proved to be the Colorado Beetle, and the Ministry has no reason to suppose that this unwelcome visitor succeeded in entering the country during 1932.*

During the autumn, it was discovered that a consignment of French cider apples, landed in September, contained fruit that had been grown at Janzé (Ille-et-Vilaine), a place where the Colorado Beetle had been recorded. Their entry into this country presented the same measure of risk of introducing

* A note of the discovery, in August, 1933, of three specimens of the Colorado Beetle at Tilbury, appeared in the September, 1933, issue of this JOURNAL (p. 489).

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the Colorado Beetle as obtains when vegetables that have been grown in or near infested areas are imported. It was too late in the season to take any useful action in respect of apples of the 1932 crop, but it was decided that, in future, French cider apples imported between March 15 and October 14 must be accompanied by a certificate in the same form as that prescribed during the same period in respect of consignments of raw vegetables, i.e., that the Colorado Beetle does not exist and has not been known to exist within a radius of at least 200 kilometres of the place where the produce was grown. Effect was given to this decision by the Importation of Plants Order of 1933.

Importation of Raw Cherries Order of 1932.—The last report contained (see this JOURNAL, November, 1932, pp. 747-8) an account of the measures adopted in 1931 to prevent the importation of cherries infested with the larvæ of the Cherry Fruit Fly. In that year, it will be remembered that seriously infested consignments from France and Germany were intercepted on May 28 and June 27 respectively, and that no infestation was found in Italian cherries except for a single maggot in a consignment examined on June 10.

Following the principle of prohibiting importation as from the dates when the arrangements in force in the preceding year proved inadequate to prevent the introduction of infested fruit, the Importation of Raw Cherries Order of 1932, which was issued on May 3, prohibited the importation of French cherries after May 27, except those grown within the small area around Honfleur, in favour of which a complete exception had been made in previous years.

The entry of Italian cherries was prohibited after June 5, except of those certified to have been grown within the region of Emilia, which were allowed to enter until June 10. The importation of German cherries was prohibited after June 27, with the exception of those certified not to have been grown south of latitude 53° N. or in East Prussia.

Whether it was due to the newly-imposed import duties or to other reasons, very few foreign cherries appeared on the English market, and it was not easy to find consignments from which samples could be drawn. Between May 24 and 27 it was found possible to sample only eleven consignments of French cherries: these were free from infesta-

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tion, with the exception of one examined on May 26, in which one small maggot was found. This proved to be the only specimen of the pest found in 1932: 50 further samples were drawn from consignments of cherries originating from Italy, Germany, Belgium and the Netherlands, but these were all free from any trace of infestation.

Importation of Raw Apples Order of 1930.—This Order was made as the result of the discovery during September and October, 1929, of several consignments of apples, imported from the United States of America, infested with the larvæ of the Apple Fruit Fly (*Rhagoletis pomonella*), an insect that is a serious pest in North America but is not known to exist in Europe.

The effect of the Order is to prohibit the landing between July 7 and November 15 in each year of all the lower grades of apples grown in the United States of America; the entry is, however, permitted of fruit certified by a duly authorized Inspector of the Federal Department of Agriculture to be one or other of the two highest grades recognized by that Department.

During the season nearly 1,800 consignments of apples from the United States were sampled and examined by the Ministry's Inspectors acting under this Order. On October 11 a consignment of 75 barrels from the State of New York was found to contain infested fruit, and had to be destroyed or re-exported: this was the first instance in which any living larvæ of the fly had been found in apples from the United States since the Order came into operation. The discovery was brought to the notice of the American Fruit Trade Commissioner in London; no further traces of infestation were subsequently found during the season.

Sale of Diseased Plants Order of 1927.—This Order prohibits the sale for planting of trees and plants that are substantially attacked by certain scheduled fungus diseases and insect pests, or that bear evidence of having been substantially attacked by the Apple Capsid (*Plesiocoris rugicollis*).

During the year 1932 some 1,600 visits were paid by the Ministry's Inspectors to nurseries, markets and auctions at which plants were exposed for sale, and the effect of the Order in maintaining a high standard of health is evidenced by the fact that only three instances came to light in which action under the Order was necessary.

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(1) In one of these, five bundles of black currant bushes offered for sale in a Somersetshire market were substantially attacked by the black currant mite: a notice was served on the vendor requiring the bushes to be burnt.

(2) Apple trees entered for sale in another market, also in Somerset, were substantially attacked by woolly aphis: a notice was served requiring the destruction of these trees. A visit was subsequently paid to the vendor's premises, with the result that a further notice was served, requiring the destruction of all the apple trees in the nursery beds from which trees were taken for sale and that were substantially attacked by fruit tree cankers or by woolly aphis. The vendor complied with the notice.

(3) The remaining example was one in which a consignment of 10 tons of Scottish seed potatoes was found to contain a large proportion of tubers substantially attacked by powdery or corky scab. A notice was served requiring the whole consignment to be destroyed or returned to the sender: the latter alternative was adopted and the facts were brought to the notice of the Department of Agriculture for Scotland.

Silver Leaf Order of 1923.—This Order requires that all dead wood of plum or apple trees must be removed and burnt before July 15 in each year. A special survey of the plum-growing districts in Kent, Cambridgeshire, Isle of Ely and Worcestershire had been carried out in 1931 and this was repeated in 1932. In some districts there appeared to be a slight increase in the amount of disease present, possibly attributable to the effect of the heavy crop of 1930, when nearly all varieties of plum trees bore large crops. In such conditions much damage is done by the breakage of the overlaid branches, with the resultant danger of infection unless the wounds are promptly trimmed up and covered with paint. The requirements of the Order were, however, being carried out generally in a satisfactory manner and in no instance was it necessary to resort to legal proceedings against occupiers for failure to carry out the requirements, although during the twelve months ended December 31, 1932, more than 1,300 visits were made by the Ministry's Inspectors acting under this Order.

Bulb Diseases (Isles of Scilly) Orders of 1923 and 1924.—These Orders, which were made at the request of the bulb growers of the Scilly Isles with a view to the prevention of the introduction of eelworm and other pests and diseases of bulbs, prohibit the entry into the Islands of daffodil and narcissus bulbs unless they are (1) officially certified as healthy, or (2) subjected to the warm-water treatment prior to shipment, or (3) consigned to the Bulb Treating Station at St. Mary's, there to be submitted to the

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warm-water treatment before being handed over to the ultimate consignees.

During the year 1932 seven licences were issued authorizing daffodil and narcissus bulbs from England to be consigned to the Bulb Treating Station at St. Mary's; 35 consignments were examined and certified as healthy.

Onion Smut Order of 1921.—This Order prohibits, *inter alia*, the planting of onions or leeks in infected soil except under licence, and for the past few years it has been the practice of the Ministry to refuse to issue such licences save in exceptional cases where little serious risk of spreading the disease is likely to be involved by the concession. The effectiveness of the Order in preventing the spread of the disease is demonstrated by the fact that only one fresh case has been discovered since 1928. The total number of cases of Onion Smut known to the Ministry to exist in England and Wales is eighteen, distributed as follows:—Northumberland 10, Durham 2, Westmorland 1, Lancashire 1, Northampton 2, Huntingdon 1, Suffolk 1.

Black Currant Mite (Norfolk) Order of 1928.—This Order, which is effective within the Administrative County of Norfolk and the County Borough of Great Yarmouth, enables officers appointed by the Local Authority for the purposes of the Order to investigate instances in which growers of black currant bushes complain that bushes growing on other premises within the district are likely to cause "Big Bud" to spread to their own bushes. If the Local Authority is satisfied that the complaint is justified, the owner of the affected bushes may be required to cut down and destroy all affected branches, or to treat the bushes in a prescribed manner. The Ministry is informed that during 1932 one complaint only was received by the Local Authority: the case was dealt with by means of a cautionary letter addressed to the occupier concerned.

Fruit Tree Pests (West Norfolk) Order of 1931.—This Order, which is effective within the more important fruit growing area of the County which lies within the Petty Sessional Divisions of Freebridge Marshland and Clackclose, follows the main lines of the Black Currant Mite (Norfolk) Order of 1928. It enables officers appointed by the Local Authority for the purposes of the Order to investigate within the scheduled district instances in which growers

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of fruit trees complain that fruit trees growing on other premises within the district are likely to cause the spread to their own trees of the following diseases or pests:—Fruit Tree Cankers, Brown Rots, Apple and Pear Scab; Fruit Tree Aphides, Apple Sucker, Winter Moth, Codling Moth, Fruit Tree Capsid Bugs, and Fruit Tree Red Spiders. If the Local Authority is satisfied that the complaint is justified, the owner of the affected trees may be required to cut out and burn all affected branches or to treat the trees in a prescribed manner. The Ministry is informed that thirteen complaints were received by the appointed officer during 1932. One case was found to be outside the scope of the Order; in another it was considered useless to issue a notice, and a third was received too late in the season for useful action to be taken. In two instances the occupiers carried out the necessary work before any notices were served.

The remaining 8 cases were reported to the Council and were dealt with as follows:—

In two cases the occupiers were warned.

In five cases the occupiers were served with notices, with which they duly complied.

In the remaining case, in which the occupier failed to comply with the requirements of the notice, legal proceedings were taken resulting in the imposition of a fine of £5 and costs.

Fruit Tree Pests (Wisbech District) Order of 1931.—

This Order is operative within the important fruit-growing area in the Isle of Ely adjoining that in which the Fruit Tree Pests (West Norfolk) Order of 1931 is operative, and is in similar terms to that Order. The Ministry is informed that during 1932 four complaints were received by the Local Authority: the cases were dealt with to the satisfaction of the complainants without invoking the compulsory powers of the Order.

Apple Capsid (Essex) Order of 1932.—This Order, which was made on October 24, 1932, was issued at the request of the Essex County Council, by whom it will be administered. It is operative within the Administrative County of Essex, including all the Boroughs and County Boroughs.

The Local Authority asked for the Order to be made on the grounds that the Apple Capsid (*Plesiocoris rugicollis*) was believed not to exist in Essex, and the fruit growers in the County were anxious that every possible step should be taken to prevent its introduction.

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The Order requires any person, other than a private grower as defined in the Order, who receives any apple trees or gooseberry or currant bushes for planting, or for sale for planting, to notify the fact to the Local Authority. Officers appointed by the Local Authority are empowered to enter any premises in the district and examine any apple trees or gooseberry or currant bushes, and the Local Authority on being satisfied that the Apple Capsid exists on any such trees and bushes may require the occupier to carry out any prescribed treatment.

The Order does not entail action by officers of the Ministry.

Wart Disease of Potatoes Order of 1923.—(a) *Spread of Infection.*—The number of parishes outside the main infected area in which Wart Disease was recorded for the first time in 1932 was 20 as compared with 24 in 1931. The first outbreak was recorded on July 15, i.e., nine days later than in the preceding year.

In most instances it appeared to be obvious that the outbreak was due to previous contamination of the soil; in cases where there appeared to be any ground for suspecting the seed, arrangements were made, where practicable, for the examination of crops grown on other land from the same seed; in no instance, however, could any of the outbreaks be attributed to seed infection.

(b) *Infected Areas.*—The number of new cases reported from parishes within the Infected Areas fell from 94 in 1931 to 37 in 1932. As in previous years, special attention has been given to potato crops grown in districts bordering on the Infected Areas, but there has been no reason to consider any extension of the boundaries of those areas.

(c) *Certification of Potatoes.*—The Order requires all potatoes used for planting in England or Wales (except "own saved" seed) to be the subject either of a Clean Land (C.L.) or True Stock (T.S.) certificate, the number of which must be quoted in all transactions in seed potatoes. Clean Land certificates can, as a rule, be issued from the Ministry's offices immediately on the receipt of the application, but in cases where a district within or bordering on the Infected Areas is involved, the crop must be inspected before the certificate can be issued. True Stock certificates are issued only in respect of varieties that have been approved by the Minister as being immune from Wart

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Disease. Inspections for these certificates have already been dealt with in the section on the inspection and certification of growing crops (see p. 829).

Particulars of the certificates issued under the Order during the past three years are as follows:—

	1930 <i>crop.</i>	1931 <i>crop.</i>	1932 <i>crop.</i>
<i>Clean Land.</i>			
No. of certificates issued ..	3,718	5,291	3,857
Acreage	51,313	64,558	58,917
<i>True Stock.</i>			
Acreage certified	2,235	2,309	3,395

Reference was made in the last report (see this JOURNAL, November, 1932, p. 754) to the demand for imported seed potatoes of the 1931 crop. Most of the crops grown from the 850 tons of imported seed for which planting licences were issued were examined by the Ministry's Inspectors during the growing and lifting season. No cases were found of Wart Disease nor of any other disease not already known in this country; the yield and purity of the crops varied considerably.

There was no shortage in the supplies of English and Scottish seed potatoes of the 1932 crop, with the result that there was practically no demand for foreign seed. Licences under Article 11 of the Order were issued authorizing the planting of some 50 tons of Dutch potatoes of varieties claimed to be specially suitable for the manufacture of "Potato Crisps."

Since the date of the last report, legal proceedings have been taken in respect of the following contravention of the Order:—

Selling for planting potatoes that were not the subject of the certificate prescribed in Article 8 (1) of the Order. A plea of "not guilty" was entered on technical grounds but the facts were not disputed. The magistrates inflicted the maximum penalty (for a first offence) of £10 with £7 6s. 6d. costs.

Wart Disease of Potatoes (Amendment) Order of 1929.—This Order is intended as an additional safeguard against the appearance of Wart Disease in the areas around Boston and Wisbech in which are grown most of the potatoes intended for export purposes. Briefly stated, the Order prohibits the planting, in allotments not exceeding a quarter of an acre in extent and in private gardens situated within the scheduled area, of any potatoes except

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certified stocks of approved immune varieties. No restrictions are, however, placed on the planting of potatoes of immune varieties saved from the crop grown on the same land in the previous year, or of five early varieties specified in the Order which are not immune from the disease.

It appears from the reports of the Inspectors engaged in the district affected by the Order that, as the result of the publicity given to its provisions by the Local Authorities concerned, coupled with the warnings addressed by the Ministry to representative gardeners and allotment holders who had contravened the regulations in previous years, the observance of the Order was far more general in 1932 than in either of the two previous seasons during which it had been in operation. No legal proceedings were taken.

Potato Testing Station.—Previous reports have given particulars of the arrangements made by the Ministry for carrying out trials of new varieties of potatoes with the object of determining their immunity from or susceptibility to Wart Disease. These trials take place each year at the Potato Testing Station of the National Institute of Agricultural Botany at Ormskirk, Lancashire, and the results are co-ordinated with those carried out at Philpstoun and Kilkeel by the Department of Agriculture for Scotland and the Ministry of Agriculture for Northern Ireland respectively.

In 1932 the number of stocks included in the second and subsequent years' tests was 30, none of which developed Wart Disease. Of the 47 entries for the first year's tests 9 became infected, 8 proved to be synonyms of existing varieties, 1 was too poor to judge, and 38 were distinct varieties. Twenty-eight new varieties were recommended for approval as the result of the 1932 trials, but only 3 of these have actually been added to the approved list. In the remaining cases inclusion has been postponed until such time as the raisers have intimated that the varieties have actually been, or will shortly be, introduced into commerce.

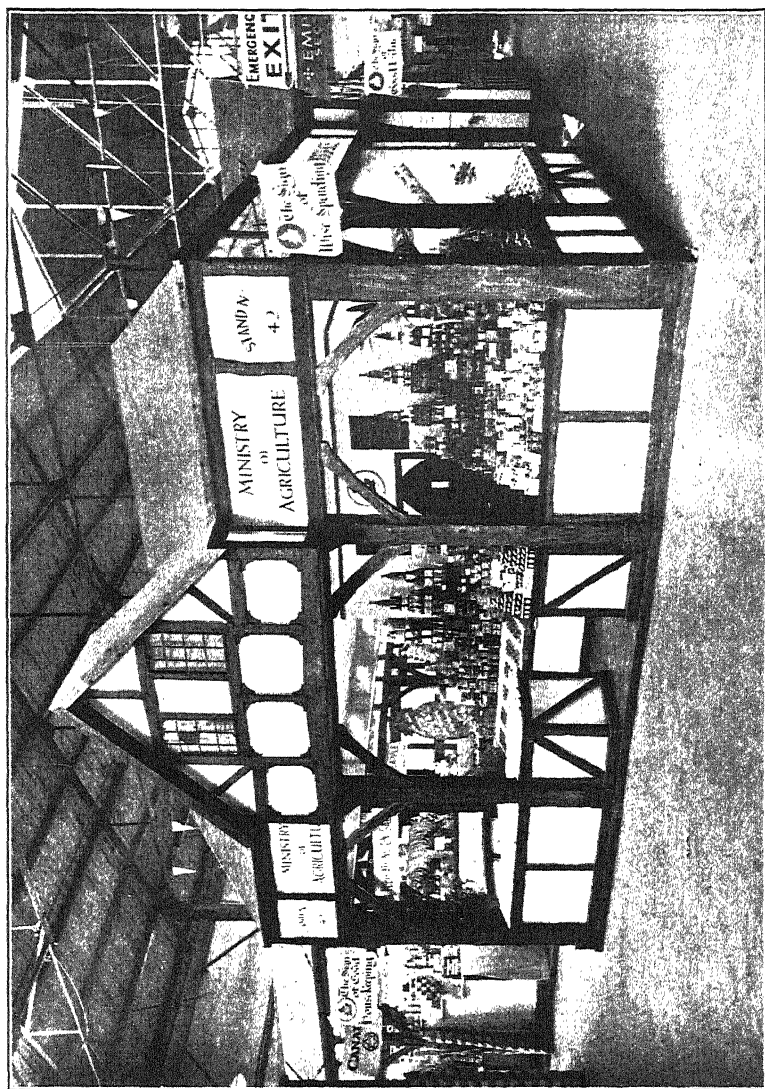
THE IMPERIAL FRUIT SHOW, 1933

THE Imperial Fruit Show, opened by H.R.H. the Duke of York, was held at Bristol this year for the first time. Equal in size and importance to London for many centuries, Bristol is rightly regarded as the capital of the West of England, and it lies amidst the oldest fruit-growing area of the kingdom, where grass orchards are to be found on most of the farms. Since the West-Country orchards were established, fruit-growing, stimulated by the results of research work, has been intensively developed on scientific principles, and in certain areas has become a specialized industry. With the refinements introduced by the adoption of scientific methods, the crops produced by the naturally prolific apple trees of the West of England should be among the finest in the world.

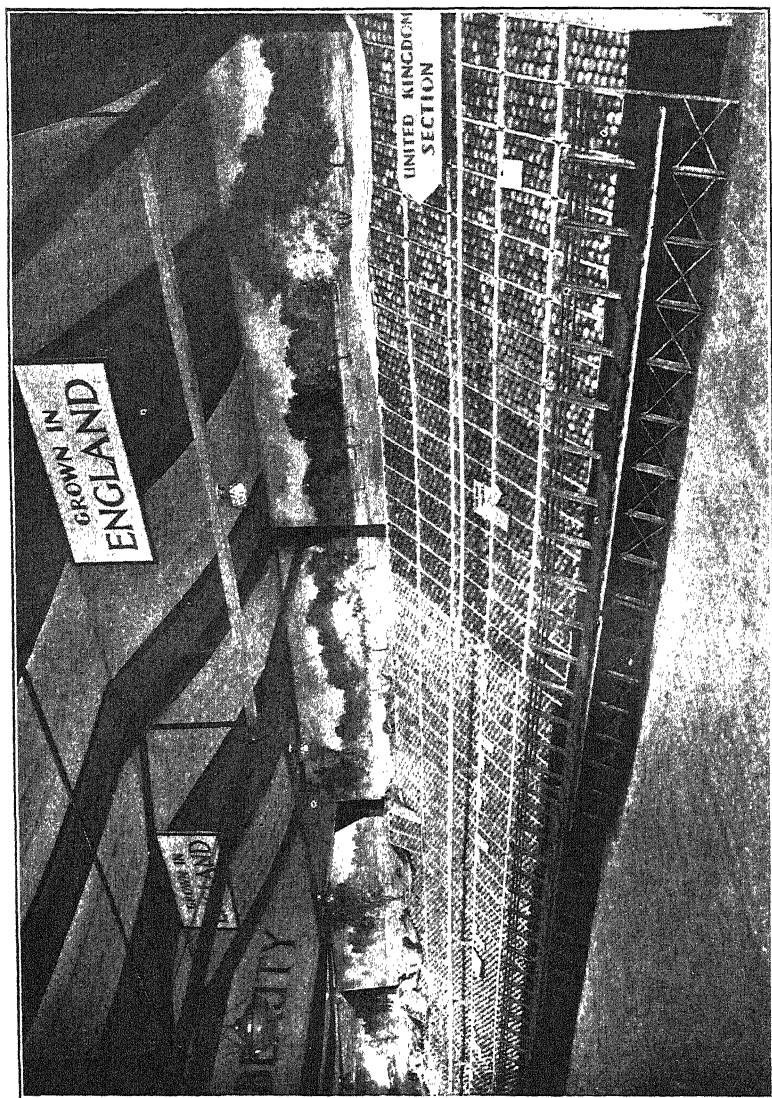
The Fruit Show of 1933 will be chiefly remembered for the beneficial effect that the prolonged summer sunshine had on the fruit. The dessert apples, in particular, were brilliantly coloured and possessed a high flavour, while the pears, the entries of which reached a numerical record, were in very fine condition and delicious in flavour. The canned fruit, too, was exceptionally good this season, large, firm fruits having been packed at the factories.

The Ministry of Agriculture's stand attracted a great deal of interest. It took the form of a shop, trading under the signs of "wise spending," "good housekeeping," "good quality," etc.—the results of purchasing National Mark produce. Here could be purchased samples of jam, honey, and canned fruit and vegetables—a very practical method of bringing the National Mark to the notice of the general public. On the back of the stand was a representation of the avenue by which the produce should come from the growers for ultimate sale in the shop. Illustrations of statutory grades and packages were affixed to the walls, while some original posters with appropriate rhymes attracted well-merited praise.

Another feature of the Show was the entry of cider apples, worthy of the West of England fame for this class of fruit and a commendable contrast with previous exhibits. Various



The Ministry's Stand at the Imperial Fruit Show, 1933.



A section of the competitive entries staged at the Imperial Fruit Show, 1933.

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sorts were exhibited in groups representative of suitable blends; they included all the most famous varieties of cider apples, such as Kingston Black and Foxwhelp in the acid class, Sweet Alford and Woodbine (sweet) and Dabinett and Knotted Kernel (bittersweet). There was a special display of bittersweet varieties, which are now in great demand for blending with the surplus culls of culinary apples.

To horticulturists, the competitive entries were of the greatest interest; these reached a very high standard in quality, an aggregate score of over 90 per cent. of the maximum points awarded being usually necessary to secure a prize. Judging was rendered the more difficult by close competition. For example, in the United Kingdom Class for 6 trays of Cox's Orange Pippin, there was a difference of only a quarter of a point between the three winning entries, the first prize being won with $89\frac{3}{4}$, the second with $89\frac{1}{2}$ and the third with $89\frac{1}{4}$ points.

The art of grading and packing has now been perfected by English growers, and the pictures on the Ministry's stand truly reflected the immense strides made in recent years. In many instances, full marks were obtained by competitors for grading and packing, while marks were lost in others because, the packer having become rather over-adept, the fruit had been too tightly wedged in the box, and the tender skin, characteristic of the English apple, had been bruised.

The trays of Cox's Orange Pippin were notable for the high colour and brilliant lustre of the fruit; the attractiveness of the pack, especially important in this type of package, seemed to be most successfully attained by fruit of deep colour, laid "cheek up" in chocolate-brown paper cups. The use of wood wool and "eye-up" packs are diminishing in popularity, although wood wool was used by Mr. Lloyd George for an entry of Cox's Orange Pippin from his garden at Churt, which secured a third prize in the class for four half-boxes. There were definite differences in the skin finish of the various samples of Cox's Orange; the best had a smooth, polished and lustrous skin, while the appearance of others was rather coarse and the finish clouded by a greyish russet spreading all over the apples. The most superb examples of Cox's Orange were to be seen in the United Kingdom Championship section for tray fruit, won by the Overbury Orchards. In the United Kingdom section (for those who had not previously won a prize) the apples were somewhat smaller, although in fine condition. This class was won by Miss Amos, a fact interesting for those who needed evidence that women were temperamentally suited to commercial fruit-growing.

Examples of other dessert apples, grown commercially in Great Britain, were Worcester Pearmain (now past its season); Jonathan, which this year has coloured as deeply as its Canadian namesake; Ellison's Orange and Laxton's Superb; the last-named is now established as a commercial dessert variety.

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The class for 50 half-boxes of any dessert variety represented another aspect of fruit-growing, i.e., mass production along lines so well perfected in Canada and the United States. In this class, four entries and three exhibitors (each exhibit requiring 3,500 apples) was an indication of the extent to which mass production of dessert apples is being undertaken in this country. Although not, of course, having the superb brilliance of tray fruits, the high quality and grading of the Cox's Orange Pippins, for which the 1st and 2nd prizes were awarded, together with the boxes of brilliantly-coloured Worcester Pearmain, were sufficient to convince anyone of the practicability of growing dessert apples commercially in this country.

The classes for 50 boxes of culinary varieties indicated that mass production of culinary apples is firmly established in this country. While Bramley's Seedling is evidently maintaining its place as our premier cooking apple, Newton Wonder, Bismarck and Monarch were also exhibited, the specimens of the last two being, however, somewhat soft. In the class for culinary apples, in the British Empire section, an exhibit of Edward VII was placed equal with one of Bramley's Seedling, the former being a good, hard and regular-sized apple, rather taller and a paler yellow-green than Bramley's.

The premier awards have a glamour all their own, and confer much distinction on the winners. The Silver Challenge Cup, for the best exhibit of Dessert Apples from the whole British Empire, was won by Seabrook & Sons, England, and the corresponding Challenge Shield for Culinary Apples was shared by Messrs. A. S. Morton and A. T. Miller.

Large fruits attract considerable popular attention, and prizes were won by 3 large apples weighing 5 lb. $\frac{1}{2}$ oz., of the variety Peasgood's Nonsuch, grown by Mr. Nield of Long Ashton, and by 3 pears, weighing 6 lb. $12\frac{1}{2}$ oz., grown by Mr. F. T. Neame.

The Imperial Fruit Show is representative of the fruit-growing industry of the whole Empire. In the "classic" events, open to the Empire, the prize for dessert apples was won by a grower in Essex, while the prize for 50 boxes of cooking apples was shared by a grower in Kent and one in East Anglia. This undoubtedly indicates that it is the methods adopted by the grower that are of paramount importance, and that fine fruit can be produced under diverse natural conditions.

There were special Canadian Championship classes, while, in the British Empire section, boxes of dessert and culinary apples from all over the Empire were standing side by side. English Cox's Orange Pippins and Worcester Pearmain could be compared with Canadian Jonathans and Macintosh Reds, while English Bramley's, Monarchs and Bismarcks were side by side with the celebrated Canadian Northern Greening.

In the British Empire section, exhibits of oranges and grape fruit illustrated the very high quality of South African produce.

The pears were in superb condition, the prize-winning entries for three trays of Comice and Conference (from Mr. Tom Neame) secured 97 per cent. of the maximum points. These two pears are the favourite commercial varieties in England, Conference being the most widely-grown and reliable cropper. When packed in trays, Conference fruits, each in a paper cup or wrapping, were laid with the long axis either in line with the length of the box or at right angles; for the latter arrangement, a partition was arranged down the centre of the box. Comice, England's highest-priced pear, was packed embedded in soft wadding to display each fruit to full advantage, or three longitudinal partitions were fixed in the boxes, the fruits being wrapped and laid like Conference.

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The competition for honey produced a total of 86 entries in the nine classes, and it was suggested that there would be even more if the quantity of honey required to be submitted in each entry were modified to allow the numerous smaller apiaries to compete. A substantial number of points was awarded for the suitability of the containers used, and full marks were obtained in the jar classes for squat jars, considerably more convenient in use than the traditional tall and narrow kind. Although only four entries of English comb-honey were exhibited, these were of excellent quality, and all obtained full marks both for suitability and uniformity of wrapping, and for uniformity and neatness of labelling; incidentally, all were packed in accordance with the National Mark Scheme.

Walking down the narrow alley ways in the body of the hall, visitors must have been impressed by the splendour of the stands arranged by the Dominions. Exhibits from the apple-growing provinces of Canada were a blaze of crimson, owing to the polished cheeks of Mackintosh Red, Jonathan and other apples, while South Africa displayed some of her wealth of gold by means of oranges and the celebrated Three Ring grape fruit. Australia's exhibit seemed more symbolic of her deserts, for, it not being her fresh fruit season, the main exhibits were of canned and dried fruits. New Zealand, Malaya, Cyprus and Northern Ireland completed the list of Empire countries represented.

Other trade exhibits occupied a large proportion of the ground space of the hall. The Silver Challenge Cup for the best trade exhibit of fruit was won by a Bristol firm—Messrs. Mansfield.

The cans of fruit for competition are collected by representatives of the Campden Research Station, who draw random samples from the stocks at the canning factories, no special "show packs" being allowed. So great is the perfection to which fruit canning has now been brought that two entries of peaches (from South Africa and Australia) secured full marks, and an exhibit of canned English gooseberries obtained 99 per cent. of the maximum points. Plums maintained their position as the most important of the British canned fruits; a considerable number of damsons were also shown, the best being of the Prune Damson variety. Raspberries were also well represented; in some, colour was rather deficient, but full marks for colour were obtained by the prize-winning entry of the Norfolk Giant variety, while a Scotch exhibit (variety Lloyd George) ran it very closely. The popularity of loganberries and strawberries seems to be still increasing. In the two classes for strawberries, a Kent and a Scottish firm won first prizes, the former packing Paxtons and the latter Scarlet Queen. Black currants and blackberries were represented by 11 and 6 entries respectively. Of the latter, the first and second entries (variety Himalaya Giant) were of outstanding merit.

English peas maintained their pride of place among canned vegetables, the variety Lincoln being still supreme. The competition was very keen; it was noticeable that precise grading is now practised and many firms put up three size-grades of peas. Other vegetables, for which special classes were formed, were carrots and stringless beans, which are now being packed in substantial quantities. Closely associated with the competitive entries of canned fruits and vegetables were the trade exhibits put up by eleven firms operating canning factories in this country, and samples could be tasted and cans purchased. The stand of the Research Station at Campden attracted the attention of those who know what valuable help has been given to the industry by this Station. The National Food Canning Council reported that the canning industry passed through a difficult year in 1932, but in spite of a certain decrease in the world consumption of canned fruits, and an increase of imports into Great Britain, 72 factories were at work in England and Wales as against 59 in 1931, while the total

THE IMPERIAL FRUIT SHOW, 1933

output in 1932 was estimated at 600,000 cwt. of canned fruit and 1,000,000 cwt. of canned vegetables. It is characteristic, however, that there is widespread co-operation between the various concerns, and during the Fruit Show a Cannery Convention was held under the auspices of the National Food Canning Council. At this Convention there were discussions with the growers on the promotion of sales and the standardization of grades; and with the tin-plate and tin-can makers on the problems of can corrosion in relation to the export of canned foods to the tropics.

"Growers' Day," an event organized by the firm of Benn Brothers, has now become deservedly well known and was attended by nearly 400 growers. A conference was held in the Victoria Rooms, and papers were read by workers at Long Ashton Research Station. In the morning, Dr. Wallace dealt with Fruit Tree Nutrition, after which Mr. A. D. Turner illustrated the functions of a County Demonstration Plot by describing the work that is being done at the Somerset Farm Institute at Cannington. In the afternoon, Dr. Kearns described the habits and control of the Apple Sawfly, and Dr. F. Swarbrick, in a stimulating paper, gave a wealth of useful information on fruit-tree spraying. Many growers took the opportunity of visiting the Long Ashton Research Station, where exhibits to illustrate the papers read on Growers' Day were arranged.

The chief function of the Show, however, is to interest the urban population in Empire fruit; and the people of Bristol and the neighbourhood came in such numbers daily that it was difficult to find room for all. From this aspect, the Bristol Show was highly successful, fully 76,000 people having visited it.

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Progress of the Pigs and Bacon Marketing Schemes :
The Contract System.—Under the Pigs and Bacon Marketing Schemes, the contract system was established as the sole method of sale of pigs to bacon curers in Great Britain. This was an essential feature of the bacon reorganization plan, in order that a reliable forward estimate might be obtained of the home output of bacon, as part of the general arrangements for the regulation of United Kingdom bacon supplies as a whole. Total supplies were to be stabilized at or near the level recommended by the Lane-Fox Commission and imports were to be adjusted to the home output figures as shown by pig contracts in each period.

Apart from its bearing on supply regulation, the contract system has obvious advantages from the standpoint of both producers of pigs and curers of bacon. The producer knows in advance the price he will get for his pigs and the curer can rely on definite supplies of raw material.

Under the Bacon Marketing Scheme, registered curers may not purchase pigs produced in Great Britain except on contracts made pursuant to the Pigs Marketing Scheme or from the Pigs Board itself. Accordingly, the Pigs Board, on Sept. 21 last, made a prescription specifying the terms on which, and the form in which, all contracts for pigs should be made as between producers and curers, and requiring all such contracts to be registered and confirmed by the Board before they become valid. October 12 was named as the closing date for presenting contracts for registration.

Contract Terms.—The terms of the prescribed contract were reached after prolonged discussions between the Pigs and Bacon Marketing Boards. They may be summarized as follows:—

The Producer undertakes to deliver a stated number of pigs of a definite weight, class, or classes, in specified months during the period Nov. 1, 1933, to Feb. 28, 1934. He may, however, deliver up to 10 per cent. above or below the contracted number in any month, or up to 5 per cent.

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over the whole period. If the producer is unavoidably prevented (by an outbreak of infectious disease, for instance) from delivering his pigs, provision is made for releasing him from his obligation. Otherwise he is liable to liquidated damages of £1 per pig on all pigs which he fails to deliver according to contract. Any pigs delivered to the curer, which are not in the specified weight class or are unsuitable on quality grounds, are to be sold by the curer to the best advantage, and the sum realized, minus expenses and the Board's levy, returned to the producer.

The Curer undertakes to pay for the pigs the contract prices prescribed. These are based on and vary with the cost of a ration of feeding stuffs set out in the contract. Five quality grades (A, B, C, D and E) for pigs are defined in the contract for each of the first 3 weight classes and it is laid down that a "basic price" of 12s. per score shall be paid for a pig of Grade C in Class I, so long as the ration price is 7s. 6d. per score. Successive deductions of 6d. a score are to be made from this price for Grade C pigs in each of the heavier weight classes and provision is made for specified additions and deductions for pigs of quality grades above and below Grade C except in the case of Class IV pigs (dead-weight over 10 score 10 lb.) Weighing and grading are to be carried out under the supervision of an officer appointed by the Pigs Board.

The Pigs Board undertakes to endeavour to replace any pigs which the producer may fail to deliver under his contract, by providing other pigs of a similar class at the contract price and, if it is unable to do so within 21 days, to pay any part of such damages, due from the producer in respect of the default, as the curer cannot recover from the producer. The Pigs Board's loss on replacement of pigs or payment of damages is, however, limited to a definite proportion of its funds earmarked for the purpose by agreement with the Bacon Board.

The contract provides for the deduction by the curer on behalf of the Pigs Board of a levy of 1s. 2d. per pig delivered and also (except in the case of Class IV pigs) of 3d. per pig, to be retained by the curer against the expense of insuring against loss through condemnation or damage of carcasses.

Group Contracts.—Besides the form of direct contract prescribed, the Pigs Board has also adopted a form of group

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contract. This caters principally for the smaller producers, many of whom, it was thought, would not wish to risk making direct contracts with curers, owing to the uncertainty of their output. The group contract is a contract between a number of producers (named in the contract) on the one hand, and the Pigs Marketing Board through an accredited agent, on the other. For the purpose of securing contracts of this kind, the Board has appointed a number of agents throughout the country, who were nominated in the first instance by the County Pig Committees of the National Farmers' Union, and include farmers, auctioneers and dealers.

The terms of the group contract are very like those of the direct contract, though the vendors are not required to specify the class of pigs to be delivered. There are, moreover, special provisions designed to enable the group agent, where one member of the group defaults, to make up the deficiency by requisitioning any available pigs which other members may have ready for delivery, or even by buying pigs, with the consent of the Board, from registered producers outside the group. The group agent is in the first instance liable to the Board for damages incurred by individual members of the group and he in turn is entitled to recover them from the producer concerned.

The group contract thus lessens very considerably the risk of default by small producers, by rendering the whole supply of pigs in the hands of members of the group available to replace deficiencies on the part of individuals. Where default nevertheless occurs, it does not relieve the producer concerned of any of his personal responsibility.

The group agent will perform other useful functions. He is expected to keep himself informed as to the supplies of contract pigs coming forward from members of his group, to notify the Board or the sub-purchaser accordingly and to arrange for delivery to meet, as far as possible, the convenience of producer and curer alike. He is also expected to have knowledge of any sources of supply of pigs, for replacement purposes, outside his group. Being himself, in many instances, an experienced pig-feeder, he should be able to give guidance to his producers on questions of feeding and management. The agents' remuneration is fixed at 1s. per pig.

Pigs purchased by the Board on group contracts are

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disposed of by the Board to curers at the contract price plus a charge of 1s. per pig.

Contracting.—The closing date for registration of contracts was October 12. A few days before this date, the number of contracts received by the Board for registration was comparatively small and it appeared possible that curers would be faced with a serious shortage of pigs. In the last three days of the contracting period, however, the position changed entirely and the number of pigs eventually contracted for, together with the relatively small number which it was calculated curers themselves would produce, amounted to 620,000.

Making allowance for those contracts which specify pigs in more than one class, or group contracts where no particular class is specified, it is estimated that the distribution of pigs delivered under contract will be:—

		<i>Per cent.</i>
Class I (7 score to 8 score 10 lb. dead weight)	419,000	68.6
Class II (8 score 11 lb. to 9 score 10 lb.) ..	117,600	19.3
Class III (9 score 11 lb. to 10 score 10 lb.) ..	60,300	9.9
Class IV (over 10 score 10 lb.)	13,400	2.2

The returns which had been obtained by the Bacon Marketing Board from all individual curers of their requirements of pigs, showed that the number of pigs contracted for was approximately 80 per cent. of the total needed to fill the existing curing establishments, but that while Wiltshire-cure factories in general had obtained all the pigs they needed, curers requiring the heavier classes of pig were a long way short of their requirements. The Boards therefore met and discussed ways and means of securing a more equitable distribution of pigs among curers and it was eventually decided (*a*) to use group contracts to meet the needs of curers requiring fewer than 50 pigs per week, (*b*) to supply to all curers who had obtained contracts for more than 80 per cent. of their requirements a list of those whose contracts fell short of that figure with the object of securing a voluntary assignment of contracts from the former to the latter, and (*c*) having obtained details of assignments of pigs of this kind, to level up all curers so far as possible by means of the remaining pigs controlled by the Pigs Board under group contracts.

When the allocation of group contracts and the assignment of direct contracts are complete, the Bacon Marketing Board will authorize each registered curer to sell the quantity of bacon represented by the contract pigs to be

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delivered to him plus any pigs he may produce himself. For this purpose, each registered curer has been asked by the Bacon Board to state the type of bacon produced by him and the appropriate conversion factor to be used in arriving at the bacon yield of pigs cured by him.

Grading of Pigs.—At the moment, one of the chief marketing activities of the Pigs Board is to supervise the grading of all pigs delivered to registered curers: the 4 weight classes prescribed for pigs sold under contract, with 5 grades in each of the first 3 classes, have been mentioned above. These grades are based on shoulder-fat measurement and belly-thickness, and certain defects are specified; for instance, soft-fat, fishy-flavour, seedy-cut, bruises, etc., exclude pigs from any of the grades and entitle the curer to refuse delivery.

The contract provides that classing and grading shall be done under the supervision of an agent of the Board; this has meant the employment by the Board of a considerable staff of graders. So far, 36 full-time and 146 part-time graders have been appointed from nominations made by County Pig Committees. These graders submit to the Board weekly reports, including information as to the number of pigs graded at each curing establishment, and the general quality of the pigs killed. They thus provide the Board's main source of information as to the level of quality of bacon pigs being produced in Great Britain and should give the Board a guide as to the directions in which education of producers is needed.

Development of Sales of British Bacon.—Interest in British bacon is developing unmistakably in hitherto uninterested quarters. The Danish Bacon Company, for example, has recently circularized registered curers offering to act as agents for the sale of their bacon and it is understood that a number of curers are using this firm's distributive machinery, while the London Provision Exchange has started to include British bacon in its weekly price quotations; the prices quoted are for standard selections similar to those in use for Danish bacon.

It is 2½ years since National Mark eggs were first sold in any quantity on the London Egg Exchange: now yet another product of British agriculture has invaded the central exchange system which used formerly to distribute only produce imported from abroad.

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Regulation of Supplies.—(i) **BACON AND HAMS:**—
(a) *Home Supplies.*—Reference was made in the November issue of this JOURNAL (p. 748) to the unexpectedly large volume of contracts for the delivery of bacon pigs by registered producers to registered curers in the preliminary contract period running from Nov. 1, 1933, to Feb. 28, 1934. The final figures showed that contracts had been signed and confirmed for 620,000 pigs. This figure included, in addition to pigs under direct contracts between pig producers and bacon curers, about 105,000 pigs covered by contracts between the Pigs Marketing Board and groups of small producers acting through the medium of group agents. These figures, allowing for the output of Northern Ireland, represent a rate of bacon production of about 3 million cwt. per annum. The latest official figures, based on the 1930 Census of Production, showed a home output of 1 $\frac{3}{4}$ million cwt. per annum.

This result means, in effect, that the home industry, in a single bound, has reached a position which it was not expected to attain before 1935. So rapid an expansion throws into relief the view, which was held by the Lane-Fox Commission, that the expansion of the home industry should, in its own interests, be orderly and not precipitate.

In the course of his speech at Chippenham on Nov. 3, the Rt. Hon. Walter E. Elliot, M.C., M.P., Minister of Agriculture and Fisheries, said that “The questions naturally arise—Where are all these pigs coming from? Is it safe to assume that the pigs will in fact be delivered and that they will be suitable for bacon production? If over 600,000 pigs are converted into bacon during these four months, will not the pork market be short of supplies? In other words, does not this large volume of contracts necessarily involve a very substantial switch over from pork to bacon, with the possibility of rapidly soaring pork prices? These questions were bound to be put by our foreign suppliers as soon as we proposed a further and very large reduction in their shipments: but we did not wait for other people to put them—we tackled the Marketing Boards at once and they felt able to reassure us on all points.”

“They gave it as their considered opinion that the large volume of contracts does not represent any considerable swing over from pork to bacon production, and that there

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is not likely during the present contract period to be any abnormal disparity between the price of pork and that of bacon. They said they were satisfied that the bacon produced from the contracted pigs would be comparable in quality with that which it would replace, and that there was no likelihood of bacon supplies being depleted by the delivery of large numbers of pigs entirely unsuited to bacon production and which the curers would have to reject. And they assured us that they were fully satisfied that the bulk of the contracts are genuinely represented by producers' pigs and that no material proportion of them are contracts made by dealers speculating on their ability to purchase the necessary supplies."

"These assurances are obviously of the utmost importance. They were given by prominent members of the two Boards, speaking with a full sense of the grave responsibility resting on their shoulders. This large army of pigs is covered by contracts—definite legal contracts, signed, sealed and delivered. And these contracts provide for substantial penalties in the event of default for reasons within the control of the producer."

"What of the future? An expansion, and a reasonable expansion, of the home industry is to take place, and will take place. But let me add a word of warning. We are now already to-day running on a level 70 per cent. above this time last year. That is already a very substantial expansion. The nation is no longer dealing with estimates. The nation is dealing with pigs—pigs and bacon, exports and imports, housewives with their shopping baskets, and working folk going out to their jobs. What is the quality of the new million and a quarter hundredweight of home bacon? What will the housewife pay for it? How much of it will she take? The answers to all these questions will alone give us the information on which can be founded the figures for the home quota next March. This is no longer a case for the Lane-Fox or for any other forecast figure of expansion. This is a case for facts. It is up to the British producer in the months to come, both pig-keeper and bacon-curer, to justify on the facts these drastic and unprecedented reductions of imports for which we, the Government, have been responsible. Now is our chance; let us see that by no weakness for which this great industry is responsible is that great chance to be thrown away."

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(b) *Dominion Supplies*.—Revised estimates of exports to the United Kingdom up to the end of February next of bacon from Canada and frozen baconer-carasses from Australia and New Zealand, indicate that with imports from the Irish Free State of bacon, and live pigs and pork carasses for conversion into bacon, total Dominion supplies during the four months November to February will be at the rate of $1\frac{1}{2}$ million cwt. per annum as compared with 1 million cwt. per annum on the basis of earlier estimates.

(c) *Foreign Supplies*.—The unexpectedly large number of pigs contracted for in Great Britain, combined with increased estimates of Dominion supplies, made it necessary to seek, as and from Nov. 1, a much more substantial reduction in imports from foreign countries than had been anticipated. The "cut" actually involved was one of 16 per cent. The position was fully discussed with representatives of the foreign countries concerned, and with a special mission sent over, for the purpose, by the Royal Danish Government. Discussions with the Danish Mission extended over the four days Oct. 27, 28, 30 and 31, following which the Royal Danish Government intimated that they could not agree voluntarily to reduce exports to the required level. Certain other countries also felt difficulty in voluntarily accepting the proposals of His Majesty's Government.

In the circumstances, there was no alternative but to effect the necessary reduction by Order under the Agricultural Marketing Act, 1933. An Order—the Bacon (Import Regulation) Order, 1933*—was accordingly made by the Board of Trade on Nov. 7. This Order prohibits the importation into the United Kingdom except under licence of any bacon produced in the following countries, viz., Argentina, Denmark (including the Farøe Islands), Estonia, Finland, Latvia, Lithuania, Netherlands, Poland and Dantzic, Sweden, United States of America and Union of Soviet Socialist Republics. A similar prohibition applies in the case of any other foreign country whose rate of exportation to the United Kingdom exceeds 400 cwt. per week, and in respect of which country a declaration has accordingly been made by the Board of Trade under the Order and published in the *Board of Trade Journal*. For the purposes of the

* Statutory Rules and Orders, 1933, No. 1050.

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Order, bacon is deemed to be imported under licence by or (b) a certificate in an approved form, issued by or under the authority of the Government of the foreign country virtue either of (a) a licence issued by the Board of Trade, concerned, in accordance with the terms of any arrangement for the time being in force between His Majesty's Government in the United Kingdom and the Government of that country. The intention is that where effective control of exports can be, and is, exercised by a foreign country, certificates under (b) will be accepted; and that in other cases, control will be exercised by means of import licences under (a).

Bacon is defined in the Order as "the carcass of a pig or any part thereof which has been salted, pickled or otherwise cured other than the head, feet, rind and offals and includes ham." The Order operates from Dec. 1, 1933, but the issue of licences and certificates thereunder during the period Dec. 1, 1933, to Feb. 28, 1934, will be related to a total importation from foreign countries of 1,979,330 cwt. in the period Nov. 10, 1933, to Feb. 28, 1934.

This total has been allocated amongst the supplying countries as follows:—

	Cwt.		Cwt.
Denmark	1,238,584	Estonia	16,616
Netherlands ..	187,165	Argentina	13,751
Poland	182,009	Finland	9,931
U.S.A.	120,321	U.S.S.R.	9,167
Lithuania	91,292	Latvia	8,976
Sweden	86,518*	Other countries ..	15,000

* For the time being, pending further consideration and without prejudice, Sweden is, by arrangement, shipping at a rate equal to 91,673 cwt. for the period November 10, 1933, to February 28, 1934.

(ii) PROCESSED MILKS.—In the July issue of this JOURNAL (p. 365) was given a note of the arrangements made for the regulation of imports of condensed whole milk, condensed skimmed milk, milk powder and cream into the United Kingdom during the three months June, July and August. It was announced in the October issue of the JOURNAL (p. 643) that it was proposed to negotiate for an extension of these arrangements to cover the remaining four months of the year.

The following statement shows the actual quantities of condensed whole milk, condensed skimmed milk, milk

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powder and cream imported into the United Kingdom from foreign and Empire sources during (i) the three months June-August, and (ii) September of this year, with comparable figures of imports during 1932:—

<i>Product.</i>	<i>Source.</i>	<i>June-August.</i>		<i>September.</i>	
		1932 000 cwt.	1933 000 cwt.	1932 000 cwt.	1933 000 cwt.
Condensed Skimmed Milk	Foreign Countries	535.3	429.7	176.5	130.4
	Empire „	18.6	28.9	7.1	10.1
	Total:	553.9	458.6	183.6	140.5
Condensed Whole Milk (Sweetened and Unsweetened)	Foreign Countries	104.4	96.6	67.2	26.5
	Empire „	27.3	48.7	19.6	12.5
	Total:	131.7	145.3	86.8	39.0
Milk Powder (Unsweetened)	Foreign Countries	33.3	23.8	21.9	5.5
	Empire „	27.5	77.4	15.7	7.8
	Total:	60.8	101.2	37.6	13.3
Cream	Foreign Countries	25.1	21.0	4.1	3.65
	Empire* „	28.8	19.7	4.5	7.35
	Total:	53.9	40.7	8.6	11.0

* Excluding imports across the land boundary into Northern Ireland from the Irish Free State.

The figures for the three months June-August necessarily include shipments that were already in transit at the time the regulation agreement was made.

(iii) POTATOES.—In the October issue of this JOURNAL (pp. 642-3) it was announced that, in view of the probability of a heavy home crop during the current season, and the low prices obtaining, arrangements had been made for the regulation of exports of potatoes from foreign countries to the United Kingdom during the four months September to December of this year.

Exports of potatoes from the Irish Free State to the United Kingdom will be limited, during the same period, to 4,500 tons, excluding (i) seed potatoes, and (ii) small consignments of ware potatoes, not exceeding one ton, moved across the Northern Ireland land boundary in farmers' own carts.

Total imports into the United Kingdom during September and October, at 1,037 tons and 2,565 tons respectively, have

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been well within the agreed limits. Figures for separate countries are as follows:—

<i>Country.</i>	<i>September, 1933</i>	<i>October, 1933.</i>
Netherlands	958 tons	1,794 tons
Belgium	32 "	30 "
Irish Free State	46 "	742 "
Other countries	1 ton	9 "

(iv) EGGS.—On November 10, the Minister of Agriculture and Fisheries received a joint deputation from the Poultry Committee of the National Farmers' Union and the National Poultry Council. The deputation represented to the Minister that, in view of the considerable expansion in home egg production, producers in this country would be facing serious difficulties next spring if imports were allowed to remain unregulated. They pressed for regulation of overseas supplies. Mr. Elliot, in reply, said that he appreciated the situation, but he felt that the case should be put before the Market Supply Committee, to which Committee he must now look for advice on these questions. The Minister undertook to draw the attention of the Market Supply Committee to the desire of the industry that the problem should be examined at an early date.

The Pigs and Bacon Marketing Schemes.—*Government Loans.*—Reference is made in the note on the Regulation of Supplies of agricultural products on p. 854, to the position arising from the large volume of contracts for the delivery of bacon pigs to curers in the four months November to February (1933-34).

The scale of the development introduces considerations which could not be fully taken into account when the agreed basis of contract prices for pigs, resulting at present in a price of 12s. per score, was fixed by negotiation between the Pigs Marketing Board and the Bacon Marketing Board some six months ago. A market will have to be found for greatly increased quantities of home-produced bacon, and new outlets will have to be organized. Special arrangements have therefore been made to assist the industry over the initial contract period while the bacon market is adjusting itself to this change in the source of supply. The Government have agreed to advance a loan to the Bacon Marketing Board, from which efficient bacon curers can be indemnified against an agreed part of any losses attributable to the circumstances referred to. The method of assessing

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losses, if any, and the making of payments out of the fund created by the loan, will be under the supervision of a Committee consisting of three representatives of the Pigs and Bacon Boards respectively, and three persons appointed by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland. A condition of the loan will be that it is to be repaid within two years by the proceeds of a levy upon registered bacon-curers who will derive the funds with which to pay this levy from an agreed deduction from the price paid to producers for their pigs in the ensuing contract periods.

Agricultural Marketing Bill.—Certain features of the arrangements regarding the loan are outside the scope of the Agricultural Marketing Acts, 1931 and 1933. One of these features is the payment of compensation by the Bacon Board to its registered producers in respect of losses incurred through the operation of the contract system. Another such feature is the provision that the Pigs Board should guarantee the repayment of the loan by the Bacon Board.

The Government has, therefore, introduced the Agricultural Marketing (No. 2) Bill which brings these features within the scope of the agricultural marketing code. Since the principles involved are believed to be of general application, the clauses of the Bill have been drafted in general terms so as to increase the usefulness of the Marketing Acts in future.

Milk Marketing Scheme.—The regional pool prices for the first accounting period (Oct. 6 to 31) vary from 12½*d.* to 14½*d.* per gal. Level delivery premiums earned and transport charges incurred by individual registered producers will be added to or deducted from their accounts. The Inter-Regional Compensation Levy was fixed at 1*d.* per gal. on all sales of liquid milk; 85 per cent. of this levy was allocated to the regional pools in proportion to the quantity of milk sold in each region for manufacture. Expenses of administration have been charged at the rate of one farthing per gal.

Contributions payable by producer-retailers on their retail sales vary from 1*d.* to 1 15/16*d.* per gal. according to region. Producer-retailers who have qualified will, however, receive credit for level delivery premiums at the rate of 1*d.* per gal. for all regions.

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Elections of county representatives to serve on the Regional Committees for which the scheme provides took place on Nov. 25. The number of representatives for each of the 11 regions has been fixed by the Board, the total for all regions being 155.

Hops Marketing Scheme.—On Oct. 28, the Hops Marketing Board announced the valuations placed on representative samples of 1933 hops of different varieties and grades. Values ranged from £16 10s. to £11 10s. per cwt. for Goldings; £15 to £11 for Golding Varieties; and similar values for Fuggles. Trading opened on Oct. 30, and it is understood that the season has again had a very successful start, the Board having disposed of a substantial proportion of their offerings at prices within the values named.

The brewing industry, which provides virtually the only outlet for English hops, has lodged a formal complaint against the operation of the scheme. This complaint has been referred to the Committee of Investigation, who will report thereon to the Minister in due course.

Potato Marketing Scheme.—On November 7, the Minister, in reply to a question asked in the House of Commons, stated that, unless the statutory procedure was further barred by legal process, the Ministers responsible hoped to lay a draft of the modified scheme before Parliament in the near future. Consideration of the modifications has proceeded between the Departments concerned and the promoters, and has now reached an advanced stage. It is hoped that the Scheme may be laid before Parliament early in December.

Appointment of Committees of Investigation.—In accordance with the provisions of Section 9 of the Agricultural Marketing Act, 1931, the Minister has appointed a Committee of Investigation for England and Wales.

It will be the duty of the Committee to consider and report to the Minister, if the Minister in any case so directs, on any reports made by a Consumers' Committee appointed under the Act, and on any complaints made to the Minister as to the operation of a marketing scheme that could not be considered by a Consumers' Committee.

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The composition of the Committee is as follows:—

The Rt. Hon. Edward Shortt, K.C. (Chairman).

Sir Percy Greenaway.

C. J. C. Palmour, Esq.

A. Pugh, Esq., C.B.E.

Professor W. R. Scott.

The Minister and the Secretary of State for Scotland, acting jointly, have appointed the same Committee to act as a Committee of Investigation for Great Britain. The duties of the Great Britain Committee will be similar to those of the England Committee, but will relate to schemes applicable both in England and in Scotland.

The Secretary of the Committee is Mr. M. G. Kendall, of the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, to whom communications for the Committee should be addressed.

Appointment of Market Supply Committee.—The Minister of Agriculture and Fisheries, the Secretary of State for Scotland and the Secretary of State for the Home Department (such Secretaries of State being concerned with agriculture in Scotland and Northern Ireland respectively), acting jointly in accordance with the provisions of Section 3 of the Agricultural Marketing Act, 1933, have appointed the following persons to be members of the Market Supply Committee:—

The Marquess of Linlithgow, K.T., G.C.I.E., O.B.E.

Professor William George Stewart Adams.

Frank Hodges, Esq., J.P.

Sir David Milne-Watson, Kt.

It will be the duty of the Committee:—

- (i) to review generally the circumstances affecting the supply of agricultural products in the United Kingdom;
- (ii) to make recommendations to the appointing Ministers as to any steps which ought, in the opinion of the Committee, to be taken for regulating that supply and to give them advice and assistance in regard thereto; and
- (iii) to report to the appointing Ministers on the operation of any Order in force and of any arrangements made for controlling the importation of an agricultural product into the United Kingdom;

and as provided in the Sea-Fishing Industry Act, 1933, it will be the further duty of the Committee:—

- (iv) to give to the appointing Ministers advice in connexion with the making and operation of Orders under that Act, and, if

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requested so to do, to give advice to them upon any specified matter relating to the supply of sea-fish in the United Kingdom.

The appointment of the Marquess of Linlithgow to be the Chairman of this Committee has already been announced. The Secretary will be Mr. E. M. H. Lloyd, formerly Assistant Secretary of the Empire Marketing Board.

The Offices of the Committee are at Queen Anne's Chambers, Tothill Street, London, S.W.1. Communications should be sent to the Secretary at this address.

National Mark Eggs.—The total output of the National Mark Egg Packing Stations for the three months, July to September, 1933, was 95.9 million eggs, of which 76.6 million were packed under the National Mark, as compared with 87.3 million and 70.7 million, respectively, for the corresponding period of 1932. The following Table shows the aggregate monthly output of the stations during these periods:—

Month	1932			1933		
	Total output of Packing Stations (fresh eggs)	Output under National Mark	Percentage of total output under National Mark	Total output of Packing Stations (fresh eggs)	Output under National Mark	Percentage of total output under National Mark
	Millions	Millions	Per cent.	Millions	Millions	Per cent.
July	30.9	24.8	80	34.5	27.6	80
Aug.	28.8	23.2	81	31.1	24.7	79
Sept.	27.6	22.7	82	30.3	24.3	80
Totals for 3 months	87.3	70.7	81	95.9	76.6	80

One of the serious problems to be faced in connexion with the home egg trade is that of slow distribution of supplies. The seasonal fluctuations, both in the volume of production and in consumer-demand make it difficult for the distributive trade to ensure that all home-produced supplies reach the consumer in a satisfactory condition. It is, however, of vital importance that the high standard of quality associated with National Mark eggs should be carried through to the consumer. The Ministry, therefore, after consultation with the National Mark Egg and Poultry

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Trade Committee, National Mark Egg Central, Limited, and the trade, is instituting a voluntary scheme for the registration of distributors who are willing to handle National Mark eggs on certain conditions designed to accelerate distribution. One of the main conditions of registration is that, during the period June 1 to Oct. 31, the registered distributor shall remove, cancel, or obliterate the National Mark labels, on all cases of National Mark eggs on his premises, the code-dates on which indicate that the eggs have been packed for a period of ten days or more. In the first instance, the scheme will apply to provincial distributors recommended by authorized packers for registration.

National Mark Dressed Poultry.—The total output of the packing stations during the three months July to September, 1933, was 173,082 birds, of which 15,241 were packed under National Mark labels.

A short course for County Poultry Instructors in the marketing of table poultry was held at the Ministry on Oct. 17, 19 and 20, and was attended by 37 Officers, representing 32 counties. A review of the present position of the poultry industry and an explanation of the revised National Mark scheme for dressed poultry were given by the Ministry's Officers. Visits were paid to the principal wholesale markets in London and to representative National Mark packing stations in the Home Counties.

Christmas, 1933, Experimental Scheme for Turkeys and Geese.—In view of anticipated heavy imports of turkeys and geese for the Christmas trade, an experimental scheme has been devised with the object of facilitating the marketing of home-produced birds of good quality and of enabling consumers to distinguish them from imported birds by means of the National Mark. Broadly speaking, turkeys and geese are produced in this country in small and scattered units, and it is impracticable for much of this class of poultry to be satisfactorily handled at the existing packing stations. It was decided, therefore, to permit, as an experiment for this season, the grading and marking of dressed turkeys and geese by authorized table-poultry packers on the premises of producers and country distributors.

Producers and country distributors desiring to take advantage of this experimental variation of the National

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Mark Dressed Poultry Scheme to have their birds graded and marked by authorized packers, were required to register through the Ministry with one of the existing packing stations before Nov. 25, and to pay the station a registration fee of 10s. to cover the graders' initial expenses. Graders from the packing stations will grade all suitable birds immediately they have been slaughtered and dressed, and the appropriate National Mark disc will be applied to all birds complying with the statutory grade designations and definitions of quality, as set out in Appendix I of Marketing Leaflet No. 17 (dated Sept. 1933). The packing station's private brand label may be applied to birds that are below National Mark standards but are of good marketable quality. A fee of 3d. is payable by the registered person to the authorized station in respect of each bird submitted for grading and marking.

Present indications suggest that a considerable portion of this year's Christmas supply of home-produced turkeys and geese will be marketed under the National Mark.

National Mark Wheat Flour.—Bread-making tests have been carried out at the National Bakery School with samples of National Mark All-English (Yeoman) flour made from 1933-crop wheat from 12 different sources. The suitability of this flour for commercial bread-making is now well established. The following observations have been extracted from the Directors' report:—

1. The flours this year all possess a greater uniformity of quality than those examined in any previous year.
2. All the flours produced doughs which gassed well, some more particularly after the first hour of fermentation. All showed good fermentative tolerance for Yeoman flours.
3. A shorter fermentation period was employed than in previous years, 2½—3 hours being allowed, with most satisfactory results for every sample except one, which required 4 hours.
4. All the flours carried 15 gal. per sack with ease, and in commercial practice this amount could be used with the bulk of National Mark (Yeoman) flours this year.
5. All the bread had a good bloom and good crumb colour. The uniformity was quite as good as in 1932.
6. The rough break characteristic of English flour was not so pronounced this year, and no objection could be raised to its effect on the cutting properties of the loaf.
7. National Mark (Yeoman) flour is excellent for blending with other home-milled bakers' flours, not only to aid in the more correct fermentation of some of the strong flours, but also as a means of improving the flavour.
8. National Mark (Yeoman) flour might also be used with fresh milk to produce an excellent milk loaf, either baked in tin or on the oven bottom, particularly for the production of "Farmhouse Bread."

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Illustrations of the test loaves appear opposite.

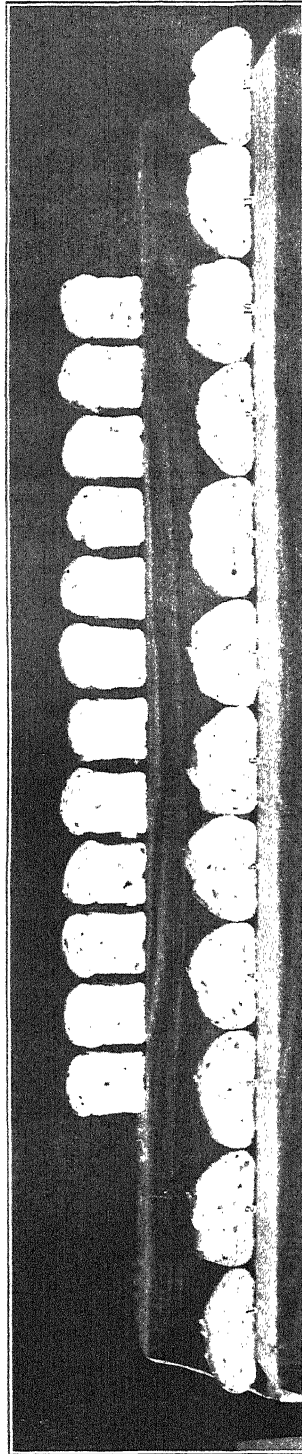
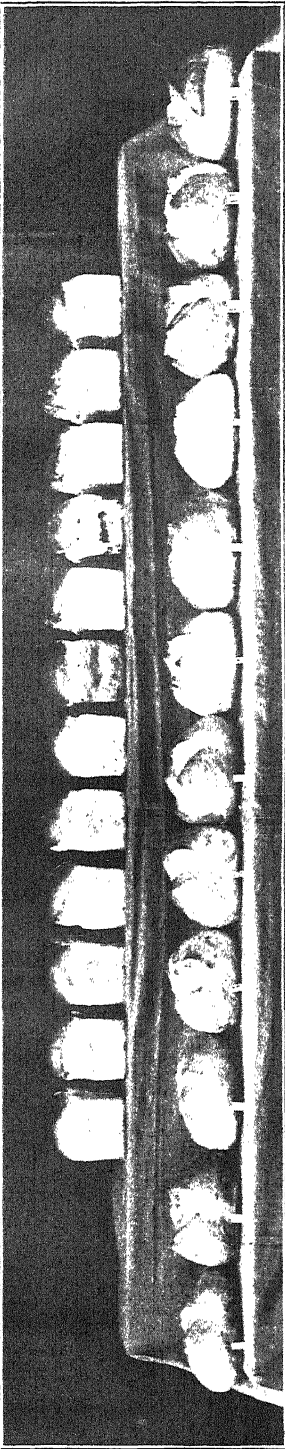
Copies of Marketing Leaflet No. 12E, giving the recipe for using National Mark flour in commercial bread-making, as recommended by the Director of the National Bakery School, may be obtained free of charge from the Ministry.

The Army Council, in connexion with a recent purchase of service biscuits, invited alternative tenders for biscuits manufactured (1) in accordance with the normal specification, and (2) exclusively from *National Mark Wholemeal* and *National Mark Straights* flour. A tender was accepted on the basis that National Mark ingredients were to be used in manufacture. The Army Council will continue to invite alternative tenders in future.

National Mark Fruit.—National Mark packers of apples and pears were again prominent among the prize-winners at the recent Imperial Fruit Show at Bristol. In the classes open to home-grown fruit, 42 first, 32 second and 33 third prizes were awarded; of these, National Mark packers succeeded in gaining 34 first, 28 second and 23 third prizes. They also succeeded in gaining all the awards except one joint second and third prize in the two classes in the British Empire Section and the two Empire championships for culinary and dessert apples. No fewer than 20 of the 21 Special Prize Awards for home-grown apples and pears were awarded to National Mark packers.

The Ministry has recently published a leaflet entitled "The Production of National Mark Apples," which records the experiences of a small grower, who, lacking practical experience at the start, adopted up-to-date methods of production, enrolled under the National Mark Scheme and succeeded in 1932 in producing a crop of which about 70 per cent. was sent to market bearing National Mark labels. Copies of this leaflet (Marketing Leaflet No. 56), may be obtained, free of charge, from the Ministry. Readers of this JOURNAL will be interested to know that the leaflet is a somewhat amended form of the article contributed to these pages by Mr. A. G. Harrington in July last (p. 307).

National Mark Vegetables.—The range of home-grown vegetables which may be marketed under the National Mark is shortly to be extended by the inclusion, amongst others, of radishes, leeks and maincrop (topped) carrots.



Bread-making Tests carried out at the National Bakery School with samples of National Mark All-English (Yeoman) Flour,
made from 1933-crop Wheat.
The Test Loaves (top) uncut and (bottom) cut.

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Radishes.—It is proposed that the scheme for radishes shall provide for three grades, viz., Selected (Long), Selected (Breakfast) and Selected (Globe). Bunches of the Selected (Long) grade will consist of 12 to 15 radishes, and the Selected (Breakfast) and the Selected (Globe) grades will be marketed in bunches weighing $\frac{1}{2}$ lb. or in double bunches weighing 1 lb. All grades will normally be packed in standard non-returnable wood packages, but the Ministry, on the advice of the Trade Advisory Committee, will be prepared to give favourable consideration to applications to use other containers of standard dimensions. Authority to apply the Mark will be granted to individual growers of radishes with an estimated annual output of not less than 1,000 dozen standard bunches or 500 dozen standard double bunches and to approved associations of growers irrespective of individual output.

Carrots.—Maincrop (topped) carrots packed under the National Mark will be marketed under two grades, viz., Selected Main Crop (Washed) and Selected Main Crop (Unwashed). The carrots will have to be between 1 and 3 in. in widest transverse diameter and not less than 3 in. in length as topped. The carrots packed in any container must be uniform in size.

Carrots of both grades packed under the National Mark would need to be packed in clean, strong, sound, serviceable sacks to hold not under 56 lb. net and to be well-filled and securely labelled. The Ministry will be prepared, on the advice of the Trade Advisory Committee, to give favourable consideration to applications from growers for permission to use containers of other types and capacities.

A label on the container must declare that the carrots fall within one of the following sizes:—

- (a) 2 to 3 in. average diameter;
- (b) 1 to 2 in. average diameter.

Authority to apply the Mark will be granted to individual growers of carrots with an estimated output of not less than 20 tons, or whose total area of land devoted to carrot production in a year is not less than 2 acres, or to associations of growers without regard to output qualification. Merchant re-packers with a minimum output of 200 tons of gradable carrots per annum will also be eligible for authorization as National Mark packers.

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Leeks.—The proposed grades for leeks packed under the National Mark will be Selected Large, Selected Medium and Selected Soup.

Selected Large leeks will have to be not less than $1\frac{1}{2}$ in. in widest transverse diameter of the stem, the stem being blanched for at least 4 in.; Selected Medium not less than $\frac{3}{4}$ in. or more than $1\frac{1}{2}$ in. in width, the stem being blanched for at least $3\frac{1}{2}$ in.; Selected Soup between $\frac{1}{2}$ and $\frac{3}{4}$ in. in width and the stem blanched for at least 2 in. Leeks packed in the grades Selected Large and Selected Medium will be trimmed to a total length of not more than 15 in., and those in the Selected Soup grade to not more than 18 in. untrimmed. All leeks shall be skinned and washed, fresh and in sound condition. Leeks in the Selected Large and Selected Medium grades will be packed in bundles of 12 or half-bundles of 6, and in the Selected Soup grade in bunches of 3 and bundles consisting of 18 bunches and half-bundles of 9 bunches. All bunches and bundles will need to be firmly tied and the leeks in any container must be reasonably uniform in size.

All grades will be packed in standard non-returnable wood crates of approved types and dimensions; the use of lids will be optional. Consideration will, however, be given to applications to use other types of containers (e.g., standard returnables).

Authority to apply the Mark will be granted to growers with a minimum of $\frac{1}{2}$ acre under leeks in a year, to associations of growers (in which case no individual minimum output will be prescribed), and to merchant packers re-packing 25,000 bundles in a year.

Marketing of Sheep by Grade and Dead-weight.—In June last, the Ministry introduced an experimental scheme under which lambs consigned direct from farm to abattoir were sold at certain centres on the basis of grade and dead-weight. This scheme, which was later extended to ewes, was introduced as a result of negotiations initiated by the North Wales Marketing Committee of the National Farmers' Union. The Committee's object was to secure at Manchester and Liverpool an alternative outlet for surpluses of grass lambs from Anglesey, Caernarvonshire, Denbighshire and Merionethshire. Local groups of producers were formed and the Committee appointed an agent for each group. The agent collected details of animals on offer and

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forwarded the required particulars to the Ministry's meat grader; the agent also received the quotations, advised acceptances and supervised the marking and loading of the animals. Approximately 11,500 lambs and ewes were dealt with at Manchester and Liverpool; an additional 4,000 animals, from various producers throughout the country, were also dealt with at the National Mark beef-grading centres.

By removing local surpluses, the scheme helped to maintain the general level of prices, and the Committee report general agreement that the scheme has amply justified itself and that its success is out of proportion to the number of sheep covered.

The practicability of selling lambs and ewes by grade and dead-weight has been established, and it has now been decided to provide facilities on an experimental basis for the disposal of all classes of sheep. These facilities will be available at Birmingham, Leeds, Bradford and Smithfield (London).

The scheme for all classes of sheep has been drawn up after extensive trials and investigations, and represents in experimental form a further contribution to the efforts that are being made to secure to producers an alternative system for the disposal of live stock. Special regard has been paid to the methods of dressing carcasses from the standpoint of their effect on quoted prices. It has been found that, whilst there is a uniform standard of dressing sheep carcasses, there are considerable variations at the different centres in the amount of offals removed in the dressing of lamb carcasses. The effect of these variations is that a lamb that yields a dressed carcass weight of 36 lb. (cold weight) at Smithfield (London) would yield a dressed carcass weight of 39 lb. at Leeds, 39½ lb. at Liverpool and 41 lb. at Birmingham. A quotation of 8½d. per lb. for this lamb at Birmingham would therefore be roughly equal to 9½d. at Leeds and Liverpool and 10d. at London.

Full particulars of the scheme are contained in Marketing Leaflet No. 46, copies of which may be obtained on application to the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Marketing Demonstrations.—At the Smithfield Fat Stock Show, Agricultural Hall, Islington, Dec. 4-8, the main feature of the Ministry's stand will be a demonstration of

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the schemes for the direct consignment of cattle, sheep and lambs from farm to abattoir for sale on a grade and dead-weight basis. A display of sides of National Mark beef, and of National Mark chickens and turkeys will also be included. A display of National Mark turkeys will also be staged at a number of other fat-stock shows during December, including Redhill (Dec. 6-7), Manchester (Dec. 9-13) and York (Dec. 12-14).

Displays of National Mark Produce.—In connexion with a National Mark Week to be held in Exeter from Jan. 22-27, 1934, the Ministry is organizing a National Mark and Home Industries Exhibition to be held in the Civic Hall, Queen Street, Exeter. Besides the Ministry's own stand, on which a comprehensive display of National Mark produce will be staged, stands will be let to National Mark packers and others. Egg-grading and cookery demonstrations will also be included. Full particulars of the Exhibition can be obtained from the Ministry or from the local Secretary of the National Mark Week—Commander Taylor, R.N. (Rtd.), Corporation Information Bureau, Queen Street, Exeter.

During the National Mark Week held in Oxford from Nov. 13-18, a display of National Mark produce was held in part of the showrooms of Messrs. Morris Garages, Ltd., kindly lent for the purpose. The opening ceremony was performed by Lt.-Col. A. J. Muirhead, M.C., M.P. (Parliamentary Private Secretary to the Minister of Agriculture). The Mayor of Oxford, Alderman Miss Lily S. Tawney, presided, and there were also present Sir Michael Sadler, Pro-Vice-Chancellor of the University, Capt. R. C. Bourne, M.P., and other prominent citizens.

Beet-Sugar Industry.—*Sugar Production.*—The total quantity of beet-sugar manufactured during October, 1933, was 2,627,585 cwt., making the total production for the season to date 3,015,719 cwt. Production last year did not commence until October and the total quantity produced in that month was 1,557,443 cwt.

Results of the Beet-Sugar Campaign, 1932-3—Correction.—In the Note published in the September issue of this JOURNAL (p. 557), giving the results of the 1932-3 manufacturing campaign, the provisional figure for production of molasses was shown as 780,000 tons as against 531,739

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tons in 1931-2. These figures should have read 78,000 and 53,174 tons, respectively. The final figure for molasses production for the 1932-3 season is now available and is 78,441 tons, on which the sum of £232,847 was paid in subsidy. The total subsidy paid in respect of the campaign was therefore £2,378,779.

Wheat Act, 1932.—*New Quota Payments Order.*—The Minister, on the recommendation of the Wheat Commission, has made an Order, The Wheat (Quota Payments) No. 2 Order, 1933, which provides that the amount of the quota payment that every miller and every importer of flour is liable to make to the Wheat Commission in respect of each cwt. of his output of flour on and from Nov. 5, 1933, shall be 21.6d. (equivalent to 4s. 6d. per sack of 280 lb.). This Order supersedes the Wheat (Quota Payments) No. 1 Order, 1933, which was made on Aug. 2 last and fixed the rate of quota payment at 16.8d. per cwt. (equivalent to 3s. 6d. per sack of 280 lb.).

The alteration in the amount of quota payment has been made necessary by the fall in the price of wheat during the last three months.

Sales of Home-grown Wheat—Cereal Year 1933-4.—Certificates lodged with the Wheat Commission, covering wheat sales from the commencement of the cereal year on Aug. 1 up to and including Nov. 17, indicated sales of 10,493,688 cwt. of millable wheat.

On Nov. 25, the Commission made a first advance payment to registered growers in respect of deficiency payments for the current cereal year. The advance was at the same rate as hitherto, viz., 3s. per cwt., and was made in respect of all proper applications received from registered growers on valid wheat certificates delivered to the Commission by Oct. 28. The total sum distributed was about £1,265,900.

DECEMBER ON THE FARM

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IN the eastern midlands, December is usually notable for the scarcity of bright sunshine and the beginning of severe frosts. On the average of recent years, rainfall is not heavy, indeed the average figures for the last eight years indicate that, except for February, December is the driest month of the year. One can never bank with any certainty on weather trends, however, and, judging by the scarcity of water in the lower reaches of the soil at the time of writing, it would not be surprising if a wet or snowy December were experienced. Work is fortunately well advanced in most areas, and root crops have been carted under ideal conditions. The principal work on the arable land is the ploughing of land after roots and carted forage crops, and the carting out of farmyard manure. The weather is always the determining factor for carrying out these operations most satisfactorily. Other questions have to be considered besides getting on with work. Thus work accomplished under unsuitable conditions may have an adverse influence on crop production in the following season. This is particularly true of soils that have to be carefully managed if a satisfactory tilth is desired on breaking down the ground with the harrows or cultivators. Where grass leys are available for breaking up, they are often ploughed out in this and the following month. Their existence is often a welcome means of utilizing horse labour when other matters are not pressing. It is a common custom in Lincolnshire to follow grass leys with potatoes, and for this purpose it is customary to give a shallow ploughing in December or January and a much deeper cross-ploughing in February or March. This course has been practised by the writer for the past four years with entirely satisfactory results. Over the greater part of the country there is little seeding of land practised during the month. Exceptions do occur, but there is always the risk that if wheat is drilled in December it will remain dormant until warmer conditions prevail. In the meantime there is the risk of loss of seed due to birds, as well as to rotting in the cold, wet soil.

Balance in Farming Practice.—The characteristics of good farming are not difficult to define, but depression has disturbed many time-honoured practices. In recent years the greatest rewards have been reaped by those possessed of the keenest anticipation of future developments and market trends. This is far from being a reflection of a healthy industry, though marketing and other schemes offer brighter prospects of stability, especially if they are rightly employed. A sound criticism of past efforts to secure stability is that they have been too piece-meal, thereby tending to abuse. This is a natural consequence, since the opportunist is ever ready to plunge heavily if he can change from an unprofitable to a more remunerative form of production. Changes of this kind may disturb the old order, and it is obvious that production may follow certain lines not because the farm is particularly fitted for that policy, but because the policy offers the best prospects of profit. One cannot seriously criticize this attitude, since a farmer's first duty to himself is to safeguard his capital.

A sound farming policy may be regarded as the foundation of success, though it by no means solves the problems that have to be faced. Exception to the marketing schemes is being taken by some on the grounds that the individuality of the farmer is sacrificed. There are indications already, however, that the necessity for raising the standards of production is providing a wide field for the exercise of skill, and, above all, common sense. Every farm has its peculiar problems that must be solved by the man on the spot, while the organization of work and labour is in itself a science that none can afford to neglect. In considering farming policy in the light of recent legislation as well as of recent economic results, it appears probable that pig-breeding, dairying and poultry-keeping will continue to claim serious attention. It is of more than ordinary interest, too, that these three classes are also the most economic converters of raw materials into human food. They are not everybody's choice, because of labour problems on the one hand and the necessity for constant attention the year round on the other. By contrast the grazier can take things easy in the early morning and throughout the winter months. There is no short cut to farming prosperity at the present time without recourse to constant hard work.

The vexed problem of grass versus arable is also one that needs close study in a new light. The seeding down of

arable to grass has been one means of reducing labour costs at a time when arable crops have not been sufficiently remunerative. There are arable crops, however, that offer some prospect of stability, wheat, sugar-beet, and possibly potatoes and certain market-garden crops being examples of these. A change-over to productive stock-farming does not render arable land less necessary, as is sometimes believed. Modern live-stock and arable interests harmonize particularly well, especially under intensive conditions. The development of the pig industry in this country ought to coincide with a development of the arable side of farming. This will in fact be necessary on many holdings, because the arable land can best utilize the large quantities of manure produced. In general, live stock are still the best agents of fertility, and the oft-repeated suggestion that farm-yard manure is too expensive to handle and apply needs to be qualified. If the farming policy is correctly organized and productive types of live stock are maintained, then the handling of the farmyard manure is not an expense that belongs to the crops to which it is applied but rather to the stock that have produced it. Things were slightly different in the old days when fattening bullocks were kept for the conversion of straw, roots and concentrates into manure for return to the land. Dairy cows and pigs are primarily kept for direct profit, and their manure is a by-product that must be disposed of without having any previous regard for the fertility of land. That it becomes available for application to land, and is of direct benefit in the promotion of better crops, is one of those fortunate examples of a by-product having a commercial value.

How far it is desirable on mixed farms to produce home-grown foodstuffs must be decided by local circumstances. Attempts to arrive at the cost of production of both crops and live stock are often misleading, because a wise distribution of labour over many duties is an obvious means of reducing labour costs on essential parts of the farming enterprise. This can be illustrated in many directions, and the soundness of mixed farming is largely dependent upon it. The cutting out of certain crops on the score of expense can only be justified when it means the elimination of unnecessary labour. If crops are cut out, and the labour for stock purposes is not fully utilized throughout the year, as is so often the case under such conditions, then there is no real gain. The farm organization should be such that

sufficient labour can be properly employed, and it is sometimes wiser to intensify farming practice, and thereby justify a high labour bill, than to curtail labour and lower the standard of farming.

The Ewe Flock.—Some detailed consideration should now be given to the ewe flock, since efficient winter management is the key to a successful lambing time. What is true of the dairy cow is equally true of the ewe, though unfortunately the condition of a ewe is largely hidden under the fleece. It is therefore desirable that ewes should be handled so that their condition can be determined, and adequate feeding provided where necessary. The ewe flock has thus far been cheaply maintained. The late growth of grass this autumn has been especially valuable for sheep, while its feeding value for this class of stock appears to have been particularly good.

The critical period in the winter management of ewes is about half way through the gestation period. At this stage inadequate feeding is quickly reflected in the loss of condition of the ewes. Late attempts to rectify this loss of condition by a superabundance of food just before lambing are rarely successful. There must be method in the management, and therefore it is a wise precaution to allow supplementary feeding in addition to pasture for the last two months or so of the gestation period. The exact quantity of food to allow must depend on local conditions. A satisfactory allowance per day per ewe is $\frac{1}{2}$ lb. of an ordinary dairy-cow production ration, but discretion is needed in regard to quantity when the other sources of food are considered. No attempt should be made to fatten ewes, since over-fat ewes are often a source of trouble at lambing time, and it is thus easy to "kill through kindness."

From now until lambing time, the ewes should be maintained as quietly as possible. Irresponsible dogging is likely to be harmful, while if circumstances permit sound ground should be provided for the flock.

The Pig Revival.—A new encouragement has been given to pig-breeding and feeding as a result of the establishment of the Pigs Marketing Board. The pig has been a much-maligned animal in the past, since it has been frequently assumed to be a constant source of loss. This is far from the fact. Losses have been experienced when pigs

DECEMBER ON THE FARM

have been kept haphazardly and spasmodically, but when a breeding policy has been persistently followed in good and bad times alike, a measure of profit has accumulated. This has been illustrated on the Midland College Farm, where the following surpluses have been realized:—

<i>Period.</i>		<i>Feeding pigs sold.</i>	<i>Surplus.</i>
1921-31	.. .. .	2,103	£1,511
1931-32	.. .. .	275	247
1932-33	.. .. .	318	77
Total over 13 years		<u>2,696</u>	<u>£1,835</u>

The above figures make full allowance for labour, but do not include rent or interest charges, assuming the unit was a separate one and that the capital invested had been borrowed.

Many factors contribute to successful pig-breeding, and it is probable that a number of them will be explored in a scientific manner on a more general scale than hitherto in this country. For example, many feeders are already appreciating the significance of periodical weighings of feeding pigs in order to gauge feeding progress, as well as to select pigs for their appropriate classes when sent to the factory. This in turn will emphasize the strain factor in securing economical gains in live weight as well as the attainment of desirable bacon form.

In estimating farrowing results, there is sometimes a tendency to assume too high an output. The following table indicates the breeding results on the Midland College Farm:—

<i>Period.</i>		<i>Sow years.</i>	<i>Litters.</i>	<i>Live Pigs.</i>	<i>Litters per year.</i>	<i>Live Pigs per year.</i>	<i>Live Pigs per litter.</i>	<i>Weight at 42 days old.</i>
1923-29	..	91.8	157	1,119	1.70	12.1	7.1	
1929-30	..	20.1	34	267	1.69	13.3	7.85	
1930-31	..	23.1	35	273	1.52	11.8	7.8	
1931-32	..	24.6	43	343	1.75	13.9	7.96	
1932-33	..	31.7	56	359	1.77	11.3	6.41	24.7lb.

It will be observed that a figure of just over 12 pigs per sow per year represents the average of the past 11 years.

NOTES ON MANURING*

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IN the November notes, the question was posed—"What is the reason for the British farmer's low average expenditure on external supplies of manures?" One attractive answer was considered and rejected as not in accordance with the statistics of fertilizer consumption, but no alternative explanation was given. If a simple single reply were desirable, it would have to be—"English farmers, as a whole, have never yet been thoroughly convinced of the great value of artificial manures when used alone or, better still, in conjunction with dung." Such a reply, however, merely leads to another question: "Why should that be so?"—a question to which a number of partial replies can be given which together account fairly satisfactorily for the position.

In the first place the climate, soils, systems of farming, and standards of cultivation in Great Britain are such that, without the addition of "artificial" manures at all it has been possible to maintain a level of production that is greatly in advance of the rest of the world and is superior to that of most individual countries. The important position of stock in English farming, for example, tends to maintain a high level of fertility, especially as it involves the use of huge quantities of imported feeding stuffs, the manurial residues of which, broadly, find their way to the crops and grass. The wide use of "leys" in the rotation acts similarly in maintaining fertility.

Next, as was illustrated in last month's notes, a great deal of the land in this country that is producing poor crops is doing so *primarily* because of lack of drainage or lack of lime. In other words, if these two conditions were remedied, the soil would at once give better crops and also be in a condition to respond to fertilizers. Thus, in the St. Albans experiment then quoted, complete artificials in the absence of chalk gave only 6 tons 13 cwt. of sugar-beet, but in the presence of chalk 8 tons 19 cwt. Now the natural tendency of the farmer is to try purchased manures on areas

* In last month's (November) "Notes on Manuring," the reference (middle of page 774) to Mr. W. Morley Davies' article on the use of lime should have been to the *Journal of the Royal Agricultural Society of England* for 1932—not 1931 as stated.

NOTES ON MANURING

where, from experience, he knows the crops are likely to be poor, and if the cause of this is bad drainage or high acidity, the fertilizers will produce no obvious improvement and their use will in consequence be barred by the farmer and his neighbours.

Another equally important reason why fertilizers fail to give satisfaction is the frequent use of materials that supply only one manurial element. Owing to a lack of understanding of the principles of plant nutrition many farmers have looked on all artificials as substitutes for one another, and have therefore often been unfortunate in the experience of their use.

The last two points lead to a consideration of the weaknesses of educational work in the past. Before the agricultural advisory service was as widely developed as it is to-day, the farmer heard of the value of fertilizers mainly from interested agents who had one or other of them to sell and pushed their sales indiscriminately with little regard to their suitability for the crops or soils concerned. The recommendations of the vendor were simple and comprehensive, and backed by examples of sales effected to well-known farmers in each district.

With the appointment of organizers in most counties it became possible for the farmer to obtain entirely disinterested advice, but unfortunately the advice was frequently much too academic to appeal to him: instead of the pithy slogans of the manure merchant he received a score of different recipes for various crops in different parts of the rotation and on varying soils, some of the ingredients of the mixtures being entirely unfamiliar to him. Naturally, many farmers refrained from adding what appeared to be an extremely complicated task to their already too numerous jobs. It was the compound-manure manufacturer rather than the farmer who responded to the recommendations of the adviser: he attempted to supply all the suggested mixtures, with the result that, at the present time, some firms quote no fewer than 200 different compound fertilizers!

On the educational side reference must also be made to the almost complete lack of co-ordinated experiments within the different advisory provinces. Indeed, the absence of planning goes farther than that: scarcely any counties can show a consistent series of trials carried out over a few years, as a result of which the county organizer can say

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with documented confidence what are satisfactory dressings of fertilizers for the common farm crops on the typical soils of his county. Now that the business side of agriculture is rapidly being organized, it is high time that we had more thorough organization of agricultural experiments, utilizing to the best advantage the improved experimental methods that have been developed and tested during the past ten years, and applying, also, the modern methods of soil analysis. If such an organized scheme were put into operation, and only a few well-planned experiments carried out in each administrative county every year, a large amount of valuable information could be rapidly accumulated. Until that has been done it is surely logical and most honest to admit that the farmer's scheme of manuring need only be a simple one and yet be very close to any prescriptions that can be justified by reliable experiments. In later notes this suggestion regarding the simplification of manuring will be dealt with more fully.

Manuring and Treatment of Grass Land.—Ten or fifteen years ago it would have been much easier to write dogmatically about the "proper" manuring of grass land than it is to-day, when a vast amount of experimental work is still in progress. It is too early yet to attempt a synthesis of all this work, and only certain general statements can safely be made.

Undoubtedly in the past the application of the single name "grass," to the almost innumerable associations of the various plant species found on grass land, has been a big impediment to progress; fortunately it is now recognized, not as a single crop, but as a large number of different crops each representing the resultant of years of competition for light, food, and air between the many plants originating from the seeds, sown and unsown. In the communities of plants brought together by accident or design there will be found instances of mutual toleration or even affinity, and also of competition or incompatibility. Ultimately there results in old pasture a fairly stable state of balance between species, a balance determined by the average effects of many local influences, including the prevailing management.

If a fresh influence or factor be brought to bear on one of these plant associations the balance will, of course, be upset, sometimes to an extraordinary degree. Thus, on the

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Welsh hills, where traditional management, maintained unchanged for many years, has produced a particular type of pasture, Stapledon has shown that a quite revolutionary change for the better can be brought about by introducing mechanical cultivation and manuring. Another recent striking example is that at Jealott's Hill, where Martin Jones has shown that quite different types of grass land can be produced from the same "seeds" mixture simply by exercising control of the grazing. Older and more familiar examples are the use of basic slag (or other phosphates) and renovation with wild white clover; the former alters the balance by changing the food supply; the latter first alters the competition between the plant species and then other important factors.

Since very different influences may bring about great changes, the farmer who is not satisfied with a particular piece of grass must view its improvement as a special problem to be solved: no solution is applicable to all cases.

(a) If the soil is waterlogged it must first be drained.

(b) If the land is in a district where notable results have followed from liming, advice should be obtained on the desirability of applying lime. Over much of the country lime is probably not of much importance on grass land, but in some districts it is a leading factor in improvement.

(c) For a matted pasture drastic harrowing must be employed: many useful implements for this purpose have been designed in recent years. In some parts lime may help to dissipate the mat.

(d) If the species present are not satisfactory and previous attempts to improve the grass have failed, renovation with wild white clover and perennial rye-grass or other grasses should be considered. In some instances the drastic measure of ploughing and reseedling may be the quickest way to success.

(e) Invariably the management policy should be reviewed. One sound rule is to graze down closely once per year, if possible by mixed stocking, e.g., cattle, sheep and horses together or in succession.

(f) Last, and probably least in importance, is the choice of manures. In the years when dung is not used, phosphates can be employed in the autumn or winter, and on many soils the phosphate should be combined with potash salts. The choice of phosphate can be between super-

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phosphate, basic slag of high citric solubility, and finely-ground mineral phosphate, the decision being determined by reliable local experience. Where potash also is advisable the standard grades of potassic superphosphate, potassic slag and potassic mineral phosphate enable the farmer to apply both manurial elements without the trouble of mixing them himself. The use of nitrogenous manures will be considered in the January notes.

Treatment of Lawns.—With lawns the objective is entirely different from that with pasture or meadow land. The ideal is a close mass of fine-leaved hard-wearing grass with few, if any, non-gramineous species. It is now becoming well known that one of the aids towards this is to maintain somewhat acid conditions which favour grasses rather than legumes. Accordingly the rather prevalent custom of applying lime (often in the hope of getting rid of moss) is to be deprecated unless the soil is extremely acid.

Sulphate of ammonia is of assistance in bringing about acid conditions and also in discouraging clovers and certain weeds, but, since continual mowing means the removal of considerable quantities of phosphate and potash, it is not advisable to omit these entirely from the manurial treatment. A very useful dressing for lawns can be made up as follows:—

24	parts	by weight of	sulphate of ammonia
8	"	"	calcined sulphate of iron
3	"	"	superphosphate
6	"	"	muriate of potash

A start can be made with this in March, when the application may be about $1\frac{1}{2}$ oz. to the square yard; three or four subsequent dressings at intervals of a few weeks may be given where considered necessary. This will remove most of the weeds that so often disfigure lawns. To assist evenness of distribution the materials may be thoroughly mixed with four or five times their own weight of sand.

Dressings of sifted loam are frequently given to lawns with the object of levelling small depressions, and assisting the growth of the grass. The only objection to this treatment is the possibility of introducing a number of weed seeds with the loam.

Manuring of Fruit Trees.—In recent years it has been shown that most soils contain insufficient potash

NOTES ON MANURING

for fruit trees. Where the potash content is low, typical "leaf scorch" will be apparent. Gooseberries are particularly good "indicators" in this respect. (Leaf scorch may be due to other causes than potash starvation, such as bad drainage.) Dressings of sulphate of potash at the rate of about 3 cwt. to the acre are suggested where leaf scorch is apparent, or potash deficiency is suspected.

There may not be any obvious improvement from dressings of potash until they have been applied for three years. In succeeding years it may be possible to reduce the rate of application to 2 cwt. of sulphate of potash per acre.

Cases of damage to the roots of young trees have been reported from the placing of potash manure in the holes before planting. Care should be taken to prevent the roots from coming into contact with potash manure.

Investigations at Long Ashton Research Station have shown that it is not only potash that is important, but the nitrogen/potash ratio, so that where potash is deficient the application of further nitrogen may accentuate the harmful effects. Plants and trees that bear their crops mainly on the young wood or partly on the young wood—such as black currants, raspberries, loganberries and plums—are benefited by a fairly high nitrogen/potash ratio. On the other hand, the application of nitrogen to apples and pears must be governed very carefully so that the right degree of vigour is maintained to produce the maximum crop of good quality fruit.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended November 22				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	7 11d	7 11d	7 11d	7 11d	9 9
„ „ Granulated (N. 16%) ..	7 11d	7 11d	7 11d	7 11d	9 5
Nitrate of lime (N. 13%) ..	..	..	..	..	..
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20-6%) ..	6 17d	6 17d	6 17d	6 17d	6 8
Calcium cyanamide (N. 20-6%)	7 1e	7 1e	7 1e	7 1e	6 10
Kainit (Pot. 14%) ..	3 6	3 0	2 17	3 0g	4 3
Potash salts (Pot. 30%) ..	5 4	5 1	4 17	4 18g	3 3
„ „ (Pot. 20%) ..	3 15	3 9	3 6	3 10g	3 6
Muriate of potash (Pot. 50%)	9 8	9 1	8 15	9 0g	3 7
Sulphate „ „ (Pot. 48%)	10 12	10 7	10 0	10 4g	4 3
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%)	3 2	..	3 4	2 16k	3 6
„ „ (S.P.A. 13½%)	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	7 15	6 15	6 10f	6 7	..
Steamed bone-flour (N. 4%, P.A. 27½-29½%) ..	5 5	5 12	5 5f	5 7	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

e Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 20s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 20s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
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Feeding in Relation to Health.—One is constantly finding that stock-breeders are at present vitally concerned about the maintenance of a sufficiently high standard of health in their stock. Disease in various forms is levying a heavy toll from stock-breeding returns, and it is felt that all possible steps should be taken to develop hardy stock capable of resisting disease. It is recognized that gross errors in feeding are likely to have harmful results, but it is possible that certain minor feeding faults, not usually regarded as important, may have more far-reaching effects than might generally be supposed.

Williams* has argued that faulty feeding of the calf adversely affects the development of its reproductive system, and that this ultimately influences breeding capacity. He submits that a faulty nutrition can be a predisposing cause of sterility and abortion, including contagious abortion; as well as retention of the afterbirth and other phenomena of a pathological nature associated with reproduction. He states that a highly valuable intrinsic defensive power against *B. abortus* and other infections interfering with normal reproduction can be built up by proper feeding and management during the rearing period. In his opinion breeding from a heifer at an early age, before she is sufficiently mature, predisposes to abortion; on the other hand, delaying breeding until heifers are fully two years old before they are put to the bull appears to result in cases of sterility. The importance of correct and adequate feeding during the double strain of lactation and reproduction, together with the need for a sufficient period of rest between lactations is emphasized. Breeding statistics are quoted in support of these views.

In regard to the period of rest, one may recall that Sanders found that there was nothing to be gained by extending it beyond 7 weeks. During this time the mam-

* *Vet. Med. Journ.*, 1932.

NOTES ON FEEDING

mary gland and other organs are apparently capable of recovering their full functional capacity. In practice it is definitely found to be important to provide the full seven weeks' rest coupled with adequate feeding. The ideal would be for cows to calve at intervals of 365 days, this period being made up of 45 weeks in milk and 7 weeks' rest. Unfortunately it is hard to attain this ideal under average farming conditions.

It is true that systematic rationing is now more widely practised than formerly, but we still find that many young stock and cows are fed on rations that fail to conform to the accepted standards. When at grass, cattle of different ages above 6 months old are reasonably well supplied with the various ingredients required, in something like correct proportion. It is during the first six months of life, and throughout the winter feeding periods, that most damage may be caused by improper feeding. Stock-breeders should endeavour to ensure that their rations are quantitatively sufficient, and that the balance of protein to starch is in the neighbourhood of the standards generally prescribed. In addition, care must be taken to see that an excessive quantity of indigestible fibre is not fed, and that, as far as may be practicable, special regard should be had to the provision of the necessary vitamins and minerals. Where fresh green food is given the risk of vitamin deficiency in winter is to an extent eliminated, but with calves under six months old, particularly in dairy herds where the amount of new milk available is necessarily limited, it is specially important, in winter, to provide cod liver oil and calcium—the latter in the form of ground chalk or limestone. Dried yeast is a valuable source of protein and of the complex Vitamin B, and, but for its price, would be more extensively used in the concentrated rations of calves, growing heifers, bulls and cows. Vitamin E concerns reproduction and therefore deserves special attention. Wheat germ has been widely employed in experimental work as the artificial source of Vitamin E, but this food and maize germ meal might be utilized to a greater extent as a source in farm practice. It has been repeatedly pointed out that maize germ is one of the cheapest foods on the market, and answers well as a constituent of the concentrated ration for cattle in winter.

The old-fashioned custom of feeding crude rock salt has much to recommend it, although now some stockmen prefer the more expensive iodized salt licks. The latter

NOTES ON FEEDING

may be efficient but the cost per ton should be calculated. Often the buyer considers merely the price per "brick." A simple calculation may give something in the nature of a surprise when the price is worked out—in terms of cwt. or per ton. Common salt, iodized, has been recommended for inclusion with calcium to give a suitable mineral mixture for general use. Suggested proportions are $1\frac{1}{2} : 1$ for cattle and sheep, and $3 : 1$ for pigs. The mixture may be included in the concentrated food at the rate of $2\frac{1}{2}$ or 2 lb. per cwt. The following mixture has been recommended by an overseas investigator as a lick, more especially for its effect upon internal parasites:—common salt 60, precipitated calcium carbonate 40, pine tar 2, copper sulphate 1 (parts by weight). The whole is mixed with a little water, kneaded into a cake and allowed to harden.

The influence of nutrition upon infestation of sheep with worms has been described by Fraser and Robertson.* Half-bred lambs were reared under worm-free conditions for 3 months. One lot of 16 was then placed on green tares and given crushed oats, while the other lot received an addition of 3 pints of separated milk and 1 lb. mixed meal per day. At 4 months the average weight of the lots was 48 lb. and 60 lb. respectively. They were then exposed to equal infection on pasture infected with *Hæmonchus contortus*. At slaughter 46 days later, the less intensively fed group showed an average infestation of 103 worms against 31 for the better fed group. It is not suggested that the use of separated milk is generally a practical proposition for feeding to lambs as a prevention for stomach worm infestation; and it might be argued that the allowance of milk along with 1 lb. of mixed meal represented an extravagant ration, unlikely to prove economical. The point of the experiment is that it confirms the general contention that nutrition is an important factor in effecting resistance to infection. The more poorly fed stock are the more susceptible. Under present conditions, lambs folded on kale and receiving a limited though fairly liberal allowance of hay, together with $\frac{1}{2}$ lb per head per day of suitably balanced concentrated food, are giving results that indicate that this is a suitable standard of feeding to promote a reasonable live-weight gain, and maintain a clean bill of health.

* Rowett Research Institute.

NOTES ON FEEDING

Feeding of Laying Stock on General Farms.—There has recently been a considerable increase in the number of poultry kept for commercial egg production on general farms. These birds are largely accommodated in slatted floor houses, or those of the folding and " Baker " unit types. In many instances the commercial laying stock are being looked after by farm workers who have had little experience of poultry. It is therefore desirable from the farmers' point of view that the system of feeding and management should be as simple as possible, and that the rations employed should be efficient without requiring the highest standard of skill in their use. Since home-grown cereals are comparatively cheap it is an advantage if the corn portion of the ration consists as far as possible of grain produced on the farm; on the other hand, it should be remembered that maize is actually cheaper per unit than home-grown wheat. It is found that rations, made up to reduce risk of trouble to a minimum, yet capable of producing a satisfactory output of eggs, are better if they include a fair proportion of wheat feed in the mash portion of the food. The rations that have been employed by the Moulton Farm Institute for birds in slatted floor and folding type houses have given satisfactory results. They are as follows:—

DRY MASH.

<i>Folding Houses.</i>	<i>Parts by Weight.</i>	<i>Slatted Floor Houses.</i>
1 Fish meal	1	1 Fish meal
3 Bran	2	2 Bran
3 Sharps	3	3 Sharps
1 Wheat meal	2	2 Wheat meal
2 Maize meal	2	2 Maize meal
$\frac{1}{2}$ lb. salt	$\frac{1}{2}$ lb. salt	$\frac{1}{2}$ lb. salt
1 lb. cod liver oil	1 lb. cod liver oil	1 lb. cod liver oil
	} per cwt.	} per cwt.

CORN.

1 Wheat
1 Kibbled Maize

The dry mash is fed in dry mash hoppers *ad lib.* These hoppers are open during the whole of the day. The corn is fed at the rate of 1 oz. per bird in the morning and 1 oz. in the afternoon.

It should be noted that the ration used in the folding houses, where exercise is more restricted, contains a smaller proportion of the richer starchy foods and more bran. Oyster shell and clean fresh water are provided in continuous supply.

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	5 0	0 8	4 12	72	1 3	0.67	9.6
Barley, British feeding	5 15	0 8	5 7	71	1 6	0.80	6.2
" Argentine	4 58	0 8	3 17	71	1 1	0.58	6.2
" Danubian	4 12	0 8	4 4	71	1 2	0.62	6.2
" Persian	4 5*	0 8	3 17	71	1 1	0.58	6.2
" Russian	4 12	0 8	4 4	71	1 2	0.62	6.2
Oats, English white	5 13	0 8	5 5	60	1 9	0.94	7.6
" " black and grey	5 13	0 8	5 5	60	1 9	0.94	7.6
" Scotch white	6 13	0 8	6 5	60	2 1	1.12	7.6
" Canadian No. 2 Western	6 5	0 8	5 17	60	1 11	1.03	7.6
" " No. 3	6 0	0 8	5 12	60	1 10	0.98	7.6
" " mixed feed	4 17	0 8	4 9	60	1 6	0.80	7.6
" Argentine	5 13	0 8	5 5	60	1 9	0.94	7.6
" German	6 0	0 8	5 12	60	1 10	0.98	7.6
" Russian	5 15	0 8	5 7	60	1 9	0.94	7.6
Maize, Argentine	4 7	0 6	4 1	78	1 0	0.54	7.6
Beans, English Winter	5 78	0 16	4 11	66	1 5	0.76	19.7
Peas, English, blue	12 58	0 14	11 11	69	3 4	1.78	18.1
" Japanese	21 15†	0 14	21 1	69	6 1	3.26	18.1
Dari, Egyptian	6 7†	0 7	6 0	74	1 7	0.85	7.2
Milling offals—Bran, British	5 10	0 15	4 15	43	2 3	1.20	9.9
" " broad	6 0	0 15	5 5	43	2 5	1.29	10
" Middlings, fine imported	5 7	0 12	4 15	69	1 5	0.76	12.1
" " coarse British	5 12	0 13	4 19	56	1 9	0.94	10.7
" Pollards, imported	4 15	0 13	4 2	62	1 4	0.71	11
Meal, barley	6 5	0 8	5 17	71	1 8	0.89	6.2
" " grade II	5 10	0 8	5 2	71	1 5	0.76	6.2
" " maize	5 2	0 6	4 16	78	1 3	0.67	7.6
" " germ	5 7	0 10	4 17	79	1 3	0.67	8.5
" " locust bean	7 0	0 5	6 15	71	1 11	1.03	3.6
" " bean	8 0	0 16	7 4	66	2 2	1.16	19.7
" " fish	15 0	1 18	13 2	59	4 5	2.37	53
Maize, cooked flaked	5 15	0 6	5 9	84	1 4	0.71	9.2
" " gluten feed	5 17	0 12	5 5	76	1 5	0.76	19.2
Linseed cake, English, 12% oil	8 15	0 19	7 16	74	2 1	1.12	24.6
" " " 9% "	8 7	0 19	7 8	74	2 0	1.07	24.6
" " " 8% "	8 2	0 19	7 3	74	1 11	1.03	24.6
" " " 6% "	8 78	0 19	7 8	74	2 0	1.07	24.6
Soya-bean cake, 5½% oil	7 28	1 6	5 16	69	1 8	0.89	36.9
Cottonseed cake—English, Egyp- tian seed, 4½% oil	4 10	0 17	3 13	42	1 9	0.94	17.3
" " English, Indian seed, 4% oil	4 108	0 17	3 13	42	1 9	0.94	17.3
" " Egyptian, 4½% oil	4 2	0 17	3 5	42	1 7	0.85	17.3
" " " decorticated, 8% "	6 15†	1 6	5 9	68	1 7	0.85	34.7
" " " decorticated, 7-8% "	6 15†	1 6	5 9	68	1 7	0.85	34.7
Coconut cake, 6% oil	6 0†	0 17	5 3	77	1 4	0.71	16.4
Ground-nut cake, 6-7% oil	5 178	0 17	5 0	57	1 9	0.94	27.3
" " " decor., 6-7% oil	7 0	1 6	5 14	73	1 7	0.85	41.3
" " " decorticated, imported, 6-7% oil	6 5	1 6	4 19	73	1 4	0.71	41.3
Palm-kernel cake, 4½-5½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " " meal, 4½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " " meal, 1-2% oil	5 5	0 11	4 14	71	1 4	0.71	16.5
Feeding treacle	5 0	0 8	4 12	51	1 10	0.98	2.7
Brewers' grains, dried ale	5 5	0 10	4 15	48	2 0	1.07	12.5
" " " porter	4 17	0 10	4 7	48	1 10	0.98	12.5

* At Bristol. ‡ At Hull. † At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of October, 1933, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £20 per ton, then since its manurial value is 105 per ton as shown above, the cost of food value per ton is £9 15. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.22d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N, 6s. 7d.; P₂O₅, 2s. 0d.; K₂O, 3s. 7d.

FARM VALUES OF FEEDING STUFFS

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	4 8
Maize	78	7.6	4 7
Decorticated ground-nut cake ..	73	41.3	6 13
„ cotton cake ..	68	34.7	6 15

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.16 shillings, and per unit protein equivalent, 1.64 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1933, issue of the Ministry's JOURNAL, p. 784.)

FARM VALUES.

CROP	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9.6	4 19
Oats	60	7.6	4 2
Barley	71	6.2	4 13
Potatoes	18	0.8	1 2
Swedes	7	0.7	0 9
Mangolds	7	0.4	0 9
Beans	66	19.7	5 9
Good meadow hay	37	4.6	2 10
Good oat straw	20	0.9	1 5
Good clover hay	38	7.0	2 16
Vetch and oat silage	13	1.6	0 18
Barley straw	23	0.7	1 8
Wheat straw	13	0.1	0 15
Bean straw	23	1.7	1 9

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

MISCELLANEOUS NOTES

Young Farmers' Clubs: Annual Cattle and Poultry Competitions

Cattle Judging.—The annual dairy-cow judging contest organized by the National Federation of Young Farmers' Clubs, and held at the Dairy Show, continues to increase in popularity. This year, twenty-seven teams of three, drawn from all parts of the country, met on October 18-19 to decide who should hold the *Farmer and Stockbreeder* Silver Challenge Cup for the ensuing twelve months. The British Dairy Farmers' Association again offered silver and bronze medals for the most successful individual competitors.

On this occasion every competitor was required to judge six different breeds of cattle, viz., Dairy Shorthorn, Ayrshire, Jersey, Red Poll, Guernsey and Friesian, three breeds being judged on each day. The Challenge Cup was eventually won by the Durham "B" team, which was 6 points ahead of the Notts. "A" team.

Details of the scores of the most successful teams and individual competitors are as follows:—

<i>Teams.</i>	<i>Points.</i>	<i>Teams.</i>	<i>Points.</i>
	(<i>Max.</i> 1,440).		(<i>Max.</i> 1,440).
1st Durham "B" ..	1,042	5th Surrey ..	1,001
2nd Notts. "A" ..	1,036	6th Northumberland ..	
3rd Monmouth ..	1,012	"A" ..	977
4th Devon "B" ..	1,006	7th Notts. "B" ..	958
		8th Yorks (West Riding)	947

Individual Competitors.

	<i>Points</i>
	(<i>Max.</i> 480)
1st { M. Laidler (Northumberland "A") } ..	415
J. L. Thomas (Surrey) ..	
3rd J. W. Vickers (Durham "B") ..	407
4th W. R. Thomas (Surrey) ..	391

The Challenge Cup and medals were presented to the successful team and competitors by Sir Joseph Lamb, M.P., who, in congratulating the teams on their performances, spoke of the great value to the country of the Young Farmers' Club movement.

Thanks are due to the Judges, Professor J. A. S. Watson, Mr. John Evens, Mr. J. C. Rushton and Mr. A. Steel, for the manner in which they carried out their duties. On

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each day they explained to the competitors and spectators the various points they had taken into consideration in placing the cattle judged.

Owing to the increase in the number of entries and the limited time available some changes in the arrangements for the competition were necessary. It was generally agreed, however, that an improvement had resulted.

Poultry Judging.—Eight teams took part in the third annual poultry judging competition for Young Farmers' Clubs, also held at the Dairy Show on October 20. The competitors were required to judge three rings, each of four birds, the breeds being Rhode Island Red, White Wyandotte and White Leghorn. The Silver Challenge Cup presented by Dr. Bernard Bailey was won by the Hunwick and District (Durham) Club with a score of 796 points out of a maximum of 900. The final placings of teams and leading individual competitors were as follows:—

<i>Teams.</i>	<i>Points.</i> (<i>Max.</i> 900).	<i>Teams.</i>	<i>Points.</i> (<i>Max.</i> 900).
1st Hunwick and District (Durham)	796	5th Sundridge (Kent) ..	588
2nd Smarden (Kent) ..	680	6th Brasted (Kent) ..	539
3rd Chiddingfold (Surrey)	674	7th Rodmell (Sussex) ..	496
4th Shipley (Sussex) ..	667	8th Barming (Kent) ..	460

<i>Individual Competitors.</i>	<i>Points.</i> (<i>Max.</i> 300)
1st T. Briggs (Hunwick and District)	277
2nd Evelyn Hedley do.	265
3rd F. Hopper do.	254
4th G. Skinner (Sundridge)	242

The Cup and medals were presented at the close of the contest by Mr. H. Howes, who, with Mr. W. Hooley, had acted as a judge. He paid tribute to the high standard of proficiency attained by the competitors and said that great credit was due to those responsible for their instruction.

The Agricultural Index Number

THE general index number of prices of agricultural produce for October at 107 was unchanged on the month but was 7 points higher than in October, 1932. Although many commodities were dearer on the month the seasonal rise in some cases, such as eggs and milk, was not proportionate to that which occurred in the base period and in these instances the relative indices showed a decline.

MISCELLANEOUS NOTES

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	102
June	153	140	131	123	111	100
July	145	141	134	121	106	101
August	144	152	135	121	105	105
September	144	152	142	120	104	107
October	139	142	129	113	100	107
November	141	144	129	112	101	—
December	140	143	126	117	103	—

Grain.—Wheat was 1*d.* dearer on the month at 4*s.* 10*d.* per cwt. while oats rose by 2*d.* to 5*s.* 5*d.* per cwt., but while the index for the former advanced by 2 points to 65, that for oats was unchanged at 78. A fall of 7*d.* to 10*s.* 2*d.* per cwt. in the average for barley was reflected in a decline of 9 points in the index to 120. As compared with a year ago, wheat was 9*d.* and oats 10*d.* per cwt. cheaper, but barley was 2*s.* 1*d.* per cwt. dearer.

Live Stock.—Fat cattle sold at practically unchanged prices during October and the index was unaltered at 99. Fat sheep and pork pigs, however, became dearer and the relative indices appreciated 7 and 4 points respectively to 107 and 110. The average for bacon pigs fell by 5*d.* per score and the index by 4 points to 97. Except for store cattle, which were cheaper, all classes of store stock realized higher prices during the month under review, the index for dairy cows advancing 4 points to 114, for store sheep 3 points to 86 and for store pigs 7 points to 139. The index for store cattle was 89 as compared with 94 in September.

Dairy and Poultry Produce.—As from October 6 the marketing of milk was controlled by the newly constituted Milk Marketing Board, and prices for the sale of milk were prescribed for the eleven regions into which England and Wales has been divided for the purpose of the Milk Marketing Scheme. On the basis of the regional sale prices for liquid milk delivered to Birmingham, London and Manchester, with an allowance for the addition due to level delivery premiums, the index for October has been calculated at 157, as compared with 160 a month earlier and 145 a year ago. The advance of $\frac{3}{4}$ *d.* per lb. in the price of butter was proportionate to that which occurred in October,

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1911-13 and the index at 98 was unaltered, but the rise of $2\frac{1}{4}d.$ per dozen in the average for eggs was proportionately smaller than in the base period and the index fell 3 points to 112. Cheese was cheaper and only 3 per cent. above the pre-war price. Fowls and geese were slightly dearer and the combined index for poultry rose one point to 122.

Other Commodities.—Potatoes appreciated in price by about 6s. per cwt. during October and the index rose by 11 points to 110. Hay also was somewhat dearer than in September, while values for wool continued to rise, the relative indices being 1 and 3 points higher at 74 and 79. Most vegetables became cheaper during the month, the combined index being 43 per cent. above pre-war. Apples averaged 31 per cent. more than in October, 1911-13.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	Oct	Oct.	July	Aug.	Sept.	Oct.
Wheat	176	75	81	72	63	65
Barley	108	95	88	125	129	120
Oats	89	90	75	79	78	78
Fat cattle... ..	118	102	98	100	99	99
„ sheep... ..	128	83	107	103	100	107
Bacon pigs	88	82	94	95	101	97
Pork „	103	88	93	96	106	110
Dairy cows	122	118	105	104	110	114
Store cattle	118	100	96	98	94	89
„ sheep	118	72	87	83	83	86
„ pigs	131	89	108	115	132	139
Eggs	129	121	103	117	115	112
Poultry	130	126	126	120	121	122
Milk	119	145	142	150	160	157
Butter	105	95	94	92	98	98
Cheese	108	114	125	115	110	103
Potatoes	210	120	95	191	99	110
Hay	81	67	68	71	73	74
Wool	76	62	72	72	76	79

Rothamsted Annual Report, 1932

AGRICULTURAL science has been blamed for some of the farmer's difficulties, and doubts have been thrown on the wisdom of continuing research that may result in increased production. Sir John Russell, in his introduction to this Report,* points out that it is indeed in times of difficulty

* Rothamsted Experimental Station, Ann. Rep., 1932, pp. 227. Obtainable from the Secretary, Rothamsted Experimental Station, Harpenden, Herts. Price 2s. 6d.

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that the exact knowledge of science can be of the greatest assistance to farmers, because "it enables them rapidly to alter their methods in accordance with the rapidly changing economic conditions." The Report describes the work that is being done at Rothamsted towards this end.

A good deal of emphasis is placed upon the work of the Statistical Department which has had a definite effect in the improvement of the technique of field experiments and the interpretation of their results. The improved methods both reduce the margin of error in the results and make an estimate of the accuracy of the experiment possible.

Experiments with sugar-beet, potatoes, fodder mixtures, kale, grass land, wheat and rotations are described. The inoculation of lucerne, and now of clover, is being closely studied in field and laboratory. The extent to which insect and fungus diseases have infested the two farms, at Rothamsted and at Woburn, is described in detail, and there is a most interesting summary of farm operations for the year by the Farm Director.

Barley receives especial attention in this Report, in a summary of the striking results of ten years' investigations conducted in the laboratory and in the field all over England, under the Research Scheme of the Institute of Brewing. The practical applications of the results in reference to methods of cultivation, manuring, and the effects of weather and season are clearly set out here. A full Report on these investigations has been published elsewhere.*

Further progress has been made in the comparison of rotary with other forms of cultivation, and in the interpretation of soil "tilth." The chemical properties of the soil are being studied by new methods, applied in particular to changes in soil organic matter as a result of different cropping or manurial treatments. The biological decomposition of organic matter is still under investigation, new information being obtained about the rotting down of straw, a surplus material that may be troublesome to deal with under mechanized farming. The purification of the effluent of sugar-beet factories by biological oxidation in filters has been carried satisfactorily to the semi-commercial scale; the effluent of milk factories is now being studied.

* Investigations on Barley. Report on the ten years' experiments under the Institute of Brewing Scheme, 1922-1931. By Sir E. J. Russell and L. R. Bishop (Supplement to *Journ. Inst. Brewing*, XXXIX, 7, July, 1933, pp. 287-421).

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The work on plant diseases well illustrates the range of problems to be tackled. In a bacterial disease of cotton from the Sudan unusual stages in the life-cycle of the bacteria were found; the genetics of a fungus were studied over many years, and related to the behaviour of natural infections; in virus diseases—those caused by agents too small to be seen under the microscope—further progress is reported. The actual way in which the virus influences the plant and travels about its tissues, and the manner of its carriage by insects, are being elucidated. Insect pests receive special study, notably in relation to the enormous fluctuations in numbers that occur, and an attempt to relate these to weather changes is in progress. Automatic recording or trapping devices play a part both in this investigation and in a study of the work and the daily life of the hive bee. Methods of insect control by the use of vegetable products as insecticides continue to be studied. Pyrethrum, a very potent agent that can be grown in this country, offers problems both in cultivation and in the preservation of the toxic principle; those intriguing tropical plants that are used by natives as fish poisons are often valuable insecticides, but it is important to be able to measure their toxicity readily, and methods for doing this are being compared.

Timber Research

THE Report of the Forest Products Research Board for the Year 1932* records an increasing number of applications for advice received from the timber industry, public authorities and others. During the year, 25,000 mechanical tests and 30,700 physical tests and other determinations were carried out, by the Board's Research Laboratory, on timber specimens submitted. It is noteworthy that much of the information desired from these tests related to new Empire timbers now being introduced, and to a comparison between the properties of the new timbers and of those already in use.

Further investigation of Dry Rot disclosed the resistance of Red Cedar and Western Hemlock, two Canadian timbers, to attack by this disease. Boards of these woods were inserted in a floor in which the fungus was in active growth. After nine months of such exposure to infection, the Hemlock showed slight signs of attack, but the Red

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 4s. (post free, 4s. 2d).

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Cedar was completely free from the fungus. Emphasis is again laid on the value of adequate ventilation under floors in preventing an outbreak of Dry Rot.

Of over 300 inquiries concerning damage to timber by beetles, the majority referred to attacks by the death-watch, furniture and powder-post beetles. Further work was carried out in kiln sterilization processes for the treatment of timber attacked by *Lyctus* powder-post beetles, of which a species, new to this country, has been detected in imported Japanese oak; and it is stated that there is a real danger of this species becoming established here in timber yards and manufacturers' premises. Indeed, considering the losses incurred through *Lyctus* beetles, the Report urges the necessity for an organized campaign on the part of timber importers and merchants, on the one hand, and of manufacturers on the other, to effect a material reduction in this form of timber damage. As a result of the past year's work, the conclusion is drawn that the liability of timber to *Lyctus* infestation depends upon the relationship existing between the diameter of the pores of the wood, and the diameter, not of the egg itself (as previously supposed) but of the egg-depositing organ of the beetle. With the exception of such small-pored timbers as horse chestnut, most hardwoods are suitable for egg-laying by species of *Lyctus* found in Britain.

Further study of the conditions for the development of the Death-watch beetle has shown that an increase in temperature, within certain limits, results in a marked reduction of the incubation period of the egg of the beetle, thereby hastening the rate of the insect's development; and this is of particular interest in relation to the progress of attack in the roofs of heated buildings.

Other points of interest in the Report relate to the increasing use of Empire timbers; the determination of smoothness in assessing the machining qualities of timbers; and methods of determining the natural durability of timbers. If sufficient support is forthcoming from the industry, it is proposed to establish plant at the Laboratory for the testing of wooden boxes, cases and containers of all kinds.

MISCELLANEOUS NOTES

Foot - and - Mouth Disease.—A further case of Foot-and-Mouth disease was confirmed by the Ministry on October 31. This was found to exist in the parish of Wirksworth, in the county of Derby, and resulted in the imposition of restrictions on the movement of all cattle, sheep, pigs, goats and deer within about 15 miles of the infected farm.

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on November 14, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Yorkshire (North Riding).—An Order cancelling as from May 1, 1934, the existing minimum and overtime rates of wages and fixing fresh rates in substitution therefor to come into force on that date. The minimum rates in the case of male workers of 21 years of age and over (other than casual workers) remain unchanged at 31s. 6d. per week of 50 hours in winter and 52½ hours in summer, with payment for employment in connection with the care of and attendance upon animals, where the total hours exceed the number mentioned above, at 3d. per hour for workers who are boarded and lodged by their employer, and 6d. per hour for those who are not so boarded and lodged. The differential rates for overtime employment are 9d. per hour on weekdays and 11d. per hour on Sundays as at present. For male casual workers of 18 years of age and over the minimum rate is 7d. (instead of 6d. as at present) per hour for all time worked, a casual worker being deemed to be a worker of 18 years of age or over employed for not more than fourteen days with the same employer between May 1 and October 1 inclusive. For female workers of 18 years of age and over the minimum rate remains unchanged at 6d. per hour for a week of 44 hours, with overtime at 9d. per hour.

Anglesey and Caernarvon.—An Order cancelling as from November 26, 1933, the existing minimum and overtime rates of wages and fixing fresh rates in substitution therefor to come into force on that date. The minimum rates for male workers of 21 years of age and over, wholly or mainly employed as horsemen, cowmen, shepherds or hwsmyrn (bailiffs) is 34s. (instead of 33s. at present) per week of 58 hours (instead of 60 hours as at present). For other male workers of similar age, the minimum rate is 30s. 6d. (instead of 29s. 6d. as at present) per week of 50 hours. The overtime rate for all classes of male workers of 21 years of age and over remains unchanged at 9d. per hour. The minimum rate for female workers of 18 years of age and over remains unchanged at 6d. per hour.

Denbigh and Flint.—An Order continuing the operation of the existing minimum and overtime rates of wages from February 16, 1934 (i.e., the day following that on which the existing rates are due to expire) until February 15, 1935. The minimum rate for male workers of 21 years of age and over employed wholly or mainly as team-men, cattlemen, cowmen, shepherds or bailiffs is 34s. per week of 60 hours. For other male workers of 21 years of age and over the minimum rate is 30s. 6d. per week of 50 hours in winter and 54 hours in summer. The overtime rate for all classes of male workers of 21 years of age and over is 9d. per hour. For female workers of 18 years of age and over the minimum rate is 5d. per hour for a week of 48 hours with overtime at 6½d. per hour.

AGRICULTURAL RETURNS, 1933: HOPS

Enforcement of Minimum Rates of Wages.—During the month ending November 14, legal proceedings were taken against four employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed			Costs allowed			Arrears of wages ordered	No. of workers involved
		£	s.	d.	£	s.	d.		
Lancashire	Chorley ...	1	0	0	2	7	0	15 0 0	1
Lincoln :									
Kesteven									
& Lindsey	Brigg ...	*			—			—	1
Yorks, N.R.	Stokesley ...	—			13	0		32 13 6	1
"	Thornaby-on-Tees	—			18	0		40 0 0	1
		1	0	0	3	18	0	87 13 6	4

* Case dismissed.

AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1933

PRODUCE OF HOPS

PRELIMINARY STATEMENT SHOWING THE ESTIMATED TOTAL PRODUCTION OF HOPS IN THE YEARS 1933 AND 1932, WITH THE ACREAGE AND ESTIMATED AVERAGE YIELD PER STATUTE ACRE IN EACH COUNTY OF ENGLAND IN WHICH HOPS WERE GROWN, AND THE AVERAGE YIELD PER ACRE OF THE TEN YEARS 1923-1932.

		Estimated total produce		Acreage returned in June		Estimated average yield per acre		Average of the 10 years 1923—1932
		1933	1932	1933	1932	1933	1932	
Countries, etc.								
Kent	East ...	Cwt. 31,000	Cwt. 28,300	Acres 2,001	Acres 1,921	Cwt. 15'5	Cwt. 14'7	Cwt. 14'4
	Mid ...	35,500	31,800	2,629	2,549	13'5	12'5	13'5
	Weald ...	60,700	55,300	4,736	4,507	12'8	12'3	12'5
	Total Kent...	127,200	115,400	9,366	8,977	13'6	12'9	13'2
Hants	...	6,700	7,000	536	520	12'4	13'3	11'5
Surrey	...	1,100	800	89	83	11'7	9'6	11'0
Sussex	...	17,300	15,900	1,200	1,195	14'4	11'6	12'2
Hereford	...	41,900	32,300	3,805	3,864	11'0	8'4	10'2
Worcester	...	20,800	17,800	1,838	1,828	11'3	9'7	9'5
Other counties*	...	1,000	800	61	64	15'0	11'5	10'2
Total	...	216,000	188,000	16,895	16,531	12'8	11'4	12'2

* Salop, Gloucester and Berkshire.

APPOINTMENTS

Note.—The returns made in June, 1933, show that the hop acreage which had experienced considerable shrinkage each year since 1929 made a slight recovery, the total area under hops this year being 360 acres more than in 1932. Moreover, the area left unpicked this year amounted to only about 20 acres, so that the area from which the crop was taken was appreciably larger than in 1932. The increase in the hop acreage was mainly in Kent, where about 390 acres more were returned this year. The average yield per acre in all hop-growing counties was above average, and the total production is estimated at 216,000 cwt. as compared with 188,000 cwt. in 1932.

The yield per acre over the whole of the hop-growing area was 12.8 cwt. as compared with 11.4 cwt. in 1932, and an average for the ten years 1923-1932 of 12.2 cwt. An improvement on the yield of 1932 was shown in all hop-growing counties except Hants, where, however, the lower yield was above average. The highest average yield per acre was that of 15.5 cwt. in East Kent, the average for the whole county being 13.6 cwt. In Sussex the yield per acre averaged 14.4 cwt. as compared with 11.6 cwt. in 1932 and a ten years' average of 12.2 cwt. The yield per acre in Surrey was 11.7 cwt. against 9.6 cwt. in 1932 and a ten years' average of 11 cwt. In the western hop-growing area Hereford obtained a yield of 11 cwt. per acre as compared with 8.4 cwt. in 1932 and a ten years' average of 10.2 cwt., and Worcester an average of 11.3 cwt. per acre as compared with 9.7 cwt. in 1932 and a ten years' average of 9.5 cwt.

On the whole, weather conditions this year were very favourable to the crop and less disease and fewer insect pests were prevalent. The quality of the crop generally is very satisfactory.

APPOINTMENTS

The Wheat Commission

The Wheat Commission have appointed Mr. F. C. Hawkes, M.A., until recently Secretary and Assistant Director of the National Institute of Agricultural Botany, to be their Secretary *vice* Mr. H. J. Johns, M.B.E., who returns, on promotion, to duty at the Ministry of Agriculture and Fisheries.

Staffs of Agricultural Research Institutes

Rothamsted Experimental Station

The Lawes Agricultural Trust Committee have appointed Mr. Geoffrey Samuel, M.Sc., to the post of Mycologist in the Department of Plant Pathology at the Rothamsted Experimental Station. Mr. Samuel has had a distinguished career, first at the University of Adelaide, Australia, and afterwards at the Waite Agricultural Research Station, Adelaide, where he was Plant Pathologist until his present appointment. He is especially well known for his work on manganese deficiency as a cause of plant disease, and for investigations into diseases of cereals, tomatoes and fruit.

County Agricultural Education Staffs

ENGLAND

Cheshire: Mr. S. Barratt, B.Sc. (Agric.), N.D.A., has been appointed Assistant Lecturer in Agriculture, *vice* Mr. F. W. Hankinson, B.Sc.

Mr. G. Basford has been appointed Estate Carpenter and Instructor in Woodwork, *vice* Mr. C. Bouch, deceased.

Miss M. Sellers, N.D.D., has been appointed Temporary Assistant Instructor in Dairying.

Nottinghamshire: Miss T. M. Prosser has been appointed Manager of the County Egg-Laying Trials, *vice* Miss E. M. Grandorge.

NOTICES OF BOOKS

WALES

Breconshire and Radnor: Mr. William Evans, B.Sc., N.D.A., N.D.D., Assistant Agricultural Organizer, has been appointed Agricultural Organizer. The post of Assistant Agricultural Organizer is now to lapse.

Carmarthenshire: Miss A. Davies, N.D.D., has been appointed Dairying Instructor, *vice* Miss A. V. Griffiths, resigned.

Monmouthshire: Miss J. E. Oliver has been appointed Instructor in Rural Domestic Economy, a new post.

NOTICES OF BOOKS

Vorlesungen über Boden-Mikrobiologie. (*A Course of Soil Microbiology.*) By Dr. A. Rippel. Pp. viii + 161. (Berlin, W.9: Julius Springer, 23-24 Lingstrasse. 1933. Price RM.6.90.)

If by microbiology one understands bacteriology, then the title substantially represents the comprehensive contents. It would be unfair, perhaps, to urge that we are not given a book on agricultural bacteriology; yet it is strange that the agricultural implications of soil bacteriology are not more explicitly stressed. In spite of an explanation in the preface, one feels that the treatment belongs to a lecture-room, from which the fields seem to be somewhat remote.

The book is stuffed with facts, something cogent being included on almost every conceivable aspect of the bacteriology of soil, water and preserved foods. Not much space is given to fungi, but, with this exception, the balancing of the subjects is extraordinarily good. The facts are stated baldly, as a rule, though the story of the Polish king who turned the bodies of fallen enemies into saltpetre will be new to many.

For cramming purposes this book would be hard to beat, but there is small prospect of an English translation being made on this side of the Atlantic, in view of the neglect of the work of British authors. Other recent work is freely quoted, but there is no author-index, and no references are given in the text; the student who might wish to read further about a special problem is thus handicapped. A list of some larger text-books is supplied in the preface. The only misprint found occurs in an English word in this list, and is suggestive.

Principles of Fruit Preservation. By T. N. Morris, M.A. Pp. xiii + 239, and 36 figs. (London: Chapman & Hall Ltd. 1933. Price 15s.)

Fundamental research is the only sure foundation for industries in which chemical and biological processes play an important part, and the fruit-preserving industries are well served by scientific workers. This book, which forms part of a series of books written by research workers of the Department of Scientific and Industrial Research, is designed primarily for the industrial technician, and gives a comprehensive account of the relevant scientific facts and principles now available. After a discussion of the chemical composition of fruit, the broad outlines of various preserving processes—jam making, fruit canning and drying—are described, together with the underlying principles that manufacturers should aim at applying intelligently. Special attention is given to certain outstanding problems such as fruit pectins and the pectin-sugar-acid-gel, and the problems of can corrosion, spoiling and syrup concentration in canning. The good bibliography will be appreciated by the research worker, while the author's avoidance of unnecessary technical terms makes the book quite suitable for the general reader.

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

Vol. XL No. 10 January, 1934

NOTES FOR THE MONTH

Home-Manufactured Fine Wheatfeed

THE British milling industry has for some time had under consideration the possibility of reorganizing the conditions under which fine wheatfeed is produced and distributed. The result was announced at the end of November, when the Millers' Mutual Association outlined an arrangement under which all the old names of fine wheatfeed (pollards, middlings, sharps, seconds, thirds, and the rest) will give place to two trade-mark names for two classes of fine wheatfeed only—"Superfine Weatings" and "Weatings."* As regards fibre content and food value, the standards for the two grades of feed will be as follows:—

"Superfine Weatings": maximum fibre content 4.5 per cent.; starch equivalent 68 per cent.

"Weatings": maximum fibre content 5.75 per cent.; starch equivalent 62 to 64 per cent.

It is observed by the Millers' Mutual Association that these standards provide fine wheatfeed with a higher feeding value than that hitherto assigned to the different grades in analytical tables, so that farmers and poultry-keepers will be able to purchase a standardized product of high-feeding value, freshly manufactured and of a guaranteed maximum fibre content. It is claimed that the old objections that grades of fine wheatfeed were very variable in quality, and were known by a score or so of names, have, therefore, been met, and that this should be to the advantage of millers and farmers alike.

It may be added that any flour miller in England and Wales may make use of the trade-mark designation for fine wheat-feed, provided that his products conform to the standards laid down, and that he sells the whole of his output under the trade mark. Full information may be obtained

* See also page 997.

NOTES FOR THE MONTH

from the Millers' Mutual Association, 40, Trinity Square, London, E.C.3.

Licensing of Bulls

By an Order dated November 30, 1933, the Minister of Agriculture and Fisheries has appointed August 1, 1934, as the day on which the Improvement of Live Stock (Licensing of Bulls) Act, 1931, will be brought into force in England and Wales.

Full particulars as to the age at which bulls will have to be licensed, and the procedure for obtaining licences, will be made available to farmers and others interested in ample time before the Act comes into force.

World's Dairy Congress, 1934

At the instance of the International Dairy Federation, the Tenth World Dairy Congress will be held in Rome and Milan next spring, under the patronage of H.M. the King of Italy. The inaugural ceremony will take place at the Capitol in Rome on April 30, and the Congress will close at Milan on May 6. The previous Congress, held at Copenhagen in 1931, was attended by delegations from 52 states and some 2,000 members from all parts of the world. It is anticipated that about 60 countries will participate in the forthcoming Congress, which will consist of the following sections: cattle and milk production; milk and its by-products as food; industry and commerce of milk and its by-products; veterinary questions connected with milk; and tropical dairying.

During the period of the Congress an International Exhibition of live stock and dairy appliances will be held at Florence, in which foreign manufacturers are invited to take part. Special arrangements are being made for all delegates to visit the Exhibition during the journey from Rome to Milan on May 4, when a halt will be made from noon till 6 p.m.

Opportunities will be afforded for visits to the most important and most modern installations for the production and preparation of milk, also for excursions to some of the principal tourist centres, beauty spots, and land reclamation sites. In matters connected with the organization of the Congress the British Dairy Farmers' Association has agreed to act as the National Committee representing the industry in this country. Full information concerning the

NOTES FOR THE MONTH

Congress may be obtained on application to the Secretary of that Association, at 28, Russell Square, London, W.C.1.

Sampling Observations on Wheat

THIS scheme of observations, in which 8 centres are co-operating under the auspices of the Agricultural Meteorological Committee, was started in October, 1932. An outline of the objects of the scheme was given in this JOURNAL for March, 1933, and quarterly reports on the first year's observations were published in the issues for March, June and October, 1933. A summary of the observations for the fourth quarter is presented in the accompanying table. These observations are intended to give the final ear number and ear height, the date that each variety is judged for cutting, and the yields of grain and straw. It is hoped to publish in the near future a full summary containing the standard errors of the various dates and quantities that have been given in the earlier quarterly reports, together with a fuller review of the whole year's results.

The experiments have been conducted on widely differing soils, and in different parts of the country; no attempt has been made to standardize manurial conditions. It will be seen that the yields were no more variable than was to be expected under these diverse conditions. The yields of both grain and straw at many of the centres were remarkably high, and at no centre can the yield be described as poor, except that at Wye. The very low yield of grain (6 cwt.) of Squarehead's Master at this station, however, can be definitely attributed to bird damage, always troublesome at Wye: the birds were, this year, particularly attracted by the small area of the earlier-maturing Squarehead's Master situated in a field of Yeoman. It is hoped that the trouble will be mitigated in future by sowing a larger area under Squarehead's Master. This very large difference is a good illustration of the danger of differential damage in variety trials, where an attack which would ordinarily be spread over a whole field is concentrated on a small area.

In the comparison of the yields of the different varieties the most remarkable feature is that the third variety, Victor at Seale-Hayne and Rothamsted, and Wilhelmina at Long Sutton, has in all the three instances yielded substantially better than either of the two standard varieties. The third varieties were chosen as being specially suitable to

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local conditions; the results show that they were well chosen. Of the two standard varieties Yeoman has yielded more grain than Squarehead's Master at seven out of the eight centres, Seale-Hayne being the only exception; here the difference is significantly in favour of Squarehead's Master (a difference of twice the standard error of the difference may be regarded as significant). The differences for the straw are not so consistent, Squarehead's Master giving the greater yield in three out of the eight centres.

The dates at which the different varieties were fit for cutting were only recorded at four stations. At all except Rothamsted, Squarehead's Master was the earlier by three or more days.

The final ear height has been measured (where it was taken) at a somewhat variable interval before harvest, but, as the height is almost stationary at this period, this is of small importance. At every station Squarehead's Master is taller than Yeoman, the mean difference in height being 9.38 cm.

The ear density is of great interest in showing how little the final yield is dependent on the number of ears. Some of the highest yields in each variety have been obtained with the lowest plant numbers, and the indication is that low ear number tended to give greater yields, i.e., that with a full plant there were definite adverse effects due to overcrowding. As between varieties, Yeoman had a higher ear number than Squarehead's Master at all centres. Victor made very few ears, the density at Seale-Hayne being just over half that of Yeoman—but the yield was a third more.

Dry matter observations were made at Rothamsted and Newport: a commendable effort on the part of Newport. The following table gives the results:—

	Date	Dry matter: cwt. per acre	Per- centage dry matter	Date	Dry matter: cwt. per acre	Per- centage dry matter	Yields: cwt. per acre	
							Grain	Straw
ROTHAMSTED								
Squarehead's Master	July 3	52.92	40.80	July 14	55.25	45.06	21.75	35.86
Yeoman	July 3	43.78	41.19	July 14	53.14	45.46	22.59	34.36
Victor	July 3	50.87	38.92	July 14	60.33	42.93	26.51	38.05
NEWPORT								
Squarehead's Master	July 11	69.94	—	July 21	75.35	—	32.87	51.04
Yeoman	July 11	75.38	—	July 21	83.98	—	37.76	56.44

SAMPLING OBSERVATIONS ON WHEAT, 1932-33. FOURTH QUARTER

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Station	Variety	Last observations before Harvest			Date fit for Cutting	Date of Harvest	Distance between Rows in.	Yields and Standard Errors of differences in cwt. per acre		
		Date	Ear Density per 32m.	Ear Height cm.				Grain	S.E. of Difference	Straw
WOBBURN, Bedfordshire	Squarehead's Master Yeoman	—	—	—	July 20 July 25	July 25 July 25	9'1	22'36 31'92	—	49'92 57'45
SEAL E. HAYNE, Devonshire	Squarehead's Master Yeoman Victor	July 28 July 28 July 28	1791 2100 1155	103'61 89'67 102'39	July 28 July 31 Aug. 1	July 28 July 31 Aug. 1	7'0	23'04 18'70 25'18	+1'26	42'72 35'16 35'87
ROTHAM-STED, ¹ Hertfordshire	Squarehead's Master Yeoman Victor	July 14 July 14 July 14	(1545) ¹ (1826) ¹ (1295) ¹	92'80 84'36 87'63	July 28 July 28 July 28	July 28 July 28 July 28	6'0	21'75 22'59 26'51	+2'06	35'86 34'36 38'05
WYE, ² Kent	Squarehead's Master Yeoman	—	(1340) ² (2007) ²	—	—	—	7'0	6'06 15'38	+0'29	39'64 22'30
NEWPORT, ³ Shropshire	Squarehead's Master Yeoman	Aug. 9 Aug. 9	1424 1590	112'32 106'93	Aug. 4 Aug. 7	Aug. 9 Aug. 9	6'0	32'87 37'76	+4'81	51'04 56'44
BOGHALL, Edinburgh	Squarehead's Master Yeoman	July 27 July 27	(1785) ² (2053) ²	101'82 95'53	—	—	6'0	32'31 33'31	+1'44	61'74 67'82
SPROWSTON, Norfolk	Squarehead's Master Yeoman	Aug. 8 Aug. 8	1735 2202	88'29 78'31	—	Aug. 8 Aug. 8	7'0	24'79 25'71	+1'33	45'78 48'26
LONG SUTTON, Hampshire	Squarehead's Master Yeoman Wilhelmia	June 23 June 23 June 23	1690 1778 1742	105'83 93'58 95'38	—	—	6'0	26'27 28'88 31'49	—	31'61 35'37 35'84

Certain values (indicated by blanks in the table) could not be determined because the observations were incomplete.

¹ Based on seven instead of eight blocks.

² Based on five instead of eight blocks.

³ Shoot number July 1.

⁴ Shoot number June 15.

⁵ Shoot number June 20.

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The dates at the two stations are closely comparable as regards stage of development of crop, since the crop was judged fit for cutting at Newport about a week later than at Rothamsted. The correlations with the final yields, particularly of the last set, are very close, but data for several years and places will be required before it is possible to say how closely the yields can be predicted from such information.

The Cattle (Import Regulation) Order, 1933

THE Order regulating the importation of certain classes of cattle and prohibiting the importation of beef, veal, and beef and veal offals from the Irish Free State has now been made by the Board of Trade under Section 1 of the Agricultural Marketing Act, 1933. The Order came into effect on January 1.

The object of the Order is to effect a considerable reduction in imports of fat cattle from the Irish Free State. Imports from that source, however, comprise not only fat cattle, including dry cows and bulls for slaughter, but also store cattle and dairy cattle.

The administration of the Order will secure:—

- (i) That there shall be a reduction of 50 per cent. in the imports of fat cattle other than dry cows and bulls for slaughter;
- (ii) that there shall be no increase in the importation of dry cows and bulls for slaughter; and
- (iii) that there shall be no increase in the importation of store cattle.

In each case comparison will be with the imports of the corresponding period a year ago. The importation of dairy cattle and calves under six months old will not be regulated.

In determining the maximum imports of the regulated classes of cattle up to the end of March next, allowance has been made for imports, if any, in the last ten days of 1933, and arrangements have been made for a classified record to be kept of these imports during that period.

On and after January 1, the importation into the United Kingdom from the Irish Free State of cattle of the regulated classes will be prohibited except in the case of animals which are marked as prescribed in the Order and are accompanied by the appropriate import licence. A separate mark has been prescribed and a separate form of licence will be issued in the case of cattle of each of the following classes:—(i) fat cattle, (ii) dry cows and bulls for slaughter, (iii) store cattle.

Cattle of these classes imported without the appropriate mark and licence will be "Prohibited Goods," and therefore liable to forfeiture under the Customs Consolidation Act, 1876. For the purposes of determining whether an animal is properly marked and described, officers of the Ministry of Agriculture and Fisheries and of the Ministry of Agriculture for Northern Ireland are being authorized as provided in the Order.

COLORADO BEETLE AT TILBURY

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READERS of this JOURNAL will have seen in the September and October issues brief statements outlining the more important facts of the recent discovery of the Colorado Beetle at Tilbury, and the measures taken to deal with it, but a more detailed account may nevertheless be of interest.

The Circumstances of the Outbreak.—The first discovery of the Colorado Beetle was made on August 21 last by Mr. A. S. Buckhurst, of the Ministry's Plant Pathological Laboratory, who found a crushed specimen on the landing-stage of the Tilbury-Gravesend Ferry. As there was nothing to show whether this was an isolated specimen that had just landed or whether it was derived from some local outbreak, a thorough inspection of the potato crops in the neighbourhood of the Ferry was at once begun, and on August 23 the search resulted in the detection of two further beetles in the soil of an allotment about half a mile from the Ferry. No beetles or their larvæ were detected on the tops of the potatoes growing in the allotment, but at the spot where the two specimens were actually found, the foliage showed some evidence of having been slightly attacked, and this directed the attention of those engaged in the search to the soil underneath. The neighbouring allotment areas, and some of the nearer potato fields were at once inspected without the discovery of further beetles, and the situation was at first somewhat difficult to explain. Since two of the beetles were in the soil and were found at some distance from the first, it could not be supposed that they had all landed within the preceding few days.

The explanation least open to objection was that the beetles discovered formed part of a small brood, the descendants of a female that had arrived earlier in the summer. An alternative explanation was that they were stragglers from some other, and probably larger, outbreak elsewhere in the district. In either event, it was necessary to proceed on the assumption that there were more beetles somewhere in the neighbourhood, either north of the Thames in Essex or south of the river in Kent, and in each county the potato crops within ten miles of Tilbury were

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methodically surveyed. After a week or so it became evident that the second explanation, viz., that the beetles were wanderers from some larger outbreak in the district, could not be the true one. Finally, support was obtained for the first explanation by the discovery during October and November of some thirty additional beetles hibernating in the soil of the block of allotments referred to previously, and of certain other gardens and allotments closely adjacent to Tilbury Docks. A careful inquiry at Tilbury failed to disclose the arrival of any shipping or merchandise that could be regarded as specially likely to bring about the introduction of the Colorado Beetle, either from France or America, and the precise origin of the outbreak will probably remain undecided.

The extraordinary coincidence that the beetles should have been found at Tilbury, not far from the spot where the only previous outbreak—that of 1901—took place, naturally prompts the question whether the pest may not have persisted in the neighbourhood undetected for a period of some thirty years. That this could have happened without the insect having spread to the neighbouring agricultural land in Essex or Kent seems, however, almost incredible; and, in the absence of any further evidence, it is only possible to suggest that a beetle arrived at Tilbury from one of the many boats passing up the river or disembarking passengers or cargo at Tilbury Dock, and that from it were descended the beetles subsequently found.

The Campaign.—The history of the various Colorado Beetle outbreaks in Europe, and indeed of the outbreaks of any foreign pest in any part of the world, shows only too clearly that successful extermination demands measures of a drastic, and even overwhelming nature, put into force without delay. Where much time is occupied in deciding the best course of action, or too careful an endeavour is made to reduce the measures taken to the minimum, failure is only too probable. For these reasons, preparations for dealing with a possible Colorado Beetle invasion had been made well in advance, and an Order under the Destructive Insects and Pests Acts, giving the Ministry the necessary powers, was in readiness for signature. It is not necessary to trouble the reader with the details of these preparations, but an outline of the considerations upon which they were based may be of interest.

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In this connexion it must be emphasized that every outbreak presents two fairly distinct types of problem. There are, first, those that arise in dealing with the site of the outbreak itself—i.e., the crops and land actually found to be infested; and, secondly, those that concern the surrounding country, which is not known to be infested but which is nevertheless under suspicion, since it is within a reasonable distance by flight of the beetle. Provided the *outbreak itself is small*—i.e., that the area colonized by the beetle does not much exceed an acre—the methods of dealing with it, although troublesome, are relatively simple.

The beetles themselves are usually sluggish, but if their surroundings are made uncomfortable or suitable food is not available, they fly readily enough, and the first essential, therefore, is to capture or destroy as many as possible of the beetles present on the potato haulm without causing them such disturbance as might persuade them to fly. The collection of the beetle by hand appears to be the best method of accomplishing this, and is quite feasible on a *small* area. Large larvæ that might burrow into the soil to pupate can be collected at the same time, and younger larvæ or eggs can be killed by the destruction of the potato haulm. Beetles and pupæ in the soil are less easy to deal with, but soil fumigation with carbon disulphide is reasonably satisfactory—again always provided that the area of land to be treated is not too large. Trap rows of potatoes can be left and searched daily for the purpose of collecting any recently-emerged beetles that may have been overlooked or may have escaped the soil fumigation.

So much for the site of the outbreak itself. The problems that arise in dealing with the surrounding area are unfortunately even more formidable. This is because an outbreak will seldom be discovered until there has been opportunity for beetles to fly away from the original centre in search of other potato crops. The beetle first discovered on the landing stage at Tilbury is a good example of this tendency to wander. By good luck this particular specimen reached a busy thoroughfare and was killed, but it might equally well have alighted on a potato field and have started a new colony. In due course this new colony would also have been detected, but again possibly not before a few emigrants had flown away to start still more colonies further afield. There is therefore a *grave* risk that the force engaged in suppressing the beetle may always be a march

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behind the enemy. In order to meet this danger, it was decided to act upon the following lines.

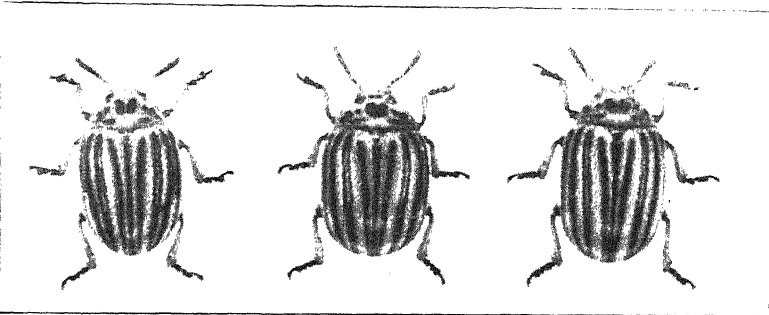
In the first place, a very thorough inspection of all allotments and garden crops was proposed, since it was felt that where only a few rows of potatoes were concerned, even occasional beetles would be detected. With field crops of potatoes, however, the position was very different, for it was unreasonable to expect that but one or two beetles would be discovered by inspection in, for instance, a 10-acre field, let alone in the 2,000 acres or so of potatoes that might be found within flight of an outbreak. It was therefore decided that field crops of potatoes should be inspected only with such intensity as would disclose the presence of a colony of the pest (which would show itself by the damaged foliage and haulm), and that to prevent the establishment of such colonies reliance should chiefly be placed upon spraying with an arsenical insecticide. This spraying might result in the death of emigrant beetles before they had laid eggs, but even if not successful in this it would at least have every chance of destroying the larvæ before they had grown to maturity. It was hoped that in this way it might be possible to enclose an outbreak by a zone of country in which the beetle would be unable to found a colony.

These brief notes show the general principles upon which the measures taken against the Colorado Beetle have been planned, and it only remains to show how in practice they were applied at Tilbury.

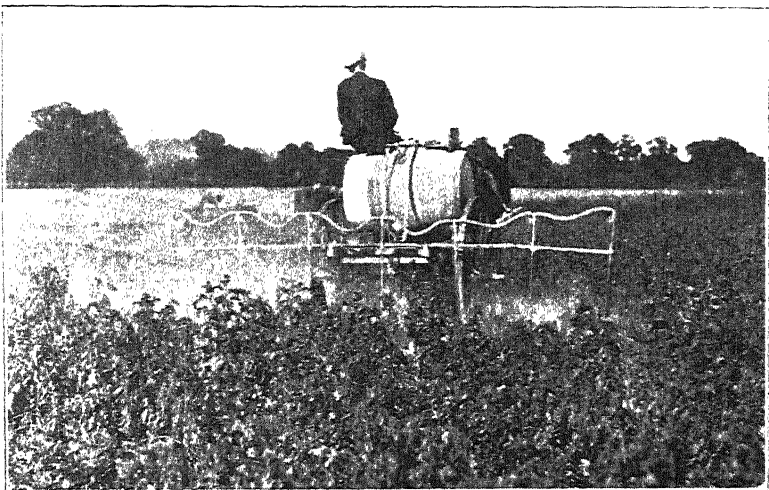
On August 24 last a number of the Ministry's inspectors, with headquarters at Tilbury and Gravesend respectively, began a detailed examination of all small plots of potatoes in the neighbourhood, while others made a rapid survey of all field crops within a radius of approximately 10 miles of the outbreak. This survey, as just explained, had the primary object of making sure that there was no large outbreak undetected in the district, but on this particular occasion it was also of importance in discovering crops that were still growing and in a condition suitable to support the pest. Owing to the time of year, this latter question proved somewhat complex: some crops were dying or had already died down, while others were still green and—in the absence of frost and Blight—seemed likely to remain attractive to the beetles for some weeks. As there was evidence (from the beetle discovered on the landing stage)



Soil injection with carbon disulphide on the affected allments at Tilbury.



Colorado Beetles (about twice natural size).



Potato spraying near Tilbury.

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that the pest might already have spread from the Tilbury centre, it was clearly desirable that crops with green foliage should be sprayed, and this work was carried out under contract by Messrs. Solignum, of London. 2,007 acres were sprayed (1,188 in Essex and 819 in Kent), the work being completed by September 8, approximately a fortnight from the beginning of the campaign. The allotment and garden inspection continued throughout this period, the plots nearer to Tilbury being inspected two or three times, without the discovery of any further beetles at that time.

Meanwhile, work on the site of the outbreak itself was in progress. The area concerned carried the usual allotment crops, including a fair proportion of potatoes, which, with the exception of certain trap rows, were at once dug and the haulm burned. The soil of the allotment in which beetles had been actually found was then given a preliminary injection with carbon disulphide to kill any beetles that might be underground, but more extensive soil treatment was deferred until the whole area could be cleaned and roughly levelled so as to enable the disinfectant to be used more effectively. The trap rows were kept under constant supervision without the discovery of further beetles, and on October 9 the whole area was injected with carbon disulphide. In the course of this operation seven additional beetles, either dying or dead as a result of the fumigation, were discovered. These beetles were evidently underground during the time in August and September when the potato foliage had been under inspection, and this fact suggested that the soil of the neighbouring allotments and gardens should also be examined. As a result, evidence of the presence of the pest was discovered in certain other plots, all, as stated previously, closely adjacent to the dock area. Wherever a beetle has been found, the soil has been treated with carbon disulphide, and the treatment has been extended to cover intervening plots to which the pest might possibly have spread before burrowing into the ground. Judging by the mortality caused by the fumigant to the other soil insects on the allotments, there is good reason to believe that most, perhaps all, of the beetles that may have been left on the areas known to have been infected have been destroyed. Soil examinations made in those parts of Tilbury more remote from the Docks have proved consistently negative, and no further work can be carried out until the spring.

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when trap crops of potatoes will be planted and kept under close supervision.

Conclusion.—Time alone will show the measure of success achieved by the operations just described, but at all events there should now be no immediate risk of the development of any widespread epidemic in the agricultural areas of Essex or Kent. That this much has been gained is due in no small measure to the willing co-operation of agriculturists and allotment holders in the district, and notably to the local Branches of the National Farmers' Union, which did their utmost to facilitate the work. It cannot be too strongly emphasized that operations against such a pest as the Colorado Beetle can be successfully carried out only with the active assistance of farmers and other occupiers, and in this respect those of Essex and Kent have set a high standard. It is also worthy of note that the public as a whole responded generously to the Ministry's request for records and specimens of any insects suspected of being Colorado Beetles: such help is essential if the pest is to be prevented from effecting a permanent settlement in Great Britain.

THE BRITISH POULTRY INDUSTRY IN 1932-33

P. A. FRANCIS, O.B.E.,

Poultry Commissioner, Ministry of Agriculture and Fisheries.

THE poultry industry of Great Britain has expanded so greatly during the past twenty years that it now occupies a highly important place in the country's agricultural production. It has, in fact, outranged the purely agricultural sphere, for the adaptability of the fowl to intensive methods has led large numbers of urban dwellers to keep poultry in backyards and gardens, and even on roofs where gardens are not available; while enthusiastic associations of poultry-keepers exist in some of the most thickly-populated areas in London and other big cities. By far the greater part of the expansion, however, has occurred in the rural areas—on general farms, small holdings and specialist poultry farms. These, together, probably account for three-quarters of Britain's total egg and poultry production, and, of this proportion, the general farmer, whose poultry form merely one branch of his operations, is probably responsible for about 60 per cent.

Since the War, the growth of the industry has been very marked. Compared with 1913, egg production in 1932 is estimated to have increased by about 180 per cent. In the former year, only about 30 per cent. of the total egg-consumption was furnished by home production, imported supplies making up the remaining 70 per cent. In 1932 the corresponding figures were home production, 60 per cent., and imported supplies, 40 per cent.

These figures, however, do not give the whole story of the industry's expansion in this country. Between 1913 and 1932, the annual consumption of eggs per head of the population increased by about 30 per cent., and practically the whole of this additional consumption was satisfied by an increase in home supplies. The British consumer, has, therefore, shown a growing preference for home-produced eggs, even though these generally command a higher price than the imported article. The consumer thus appears to be exercising discrimination and displaying a keener appreciation of fresh eggs of good quality.

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The demand for home-produced eggs was no doubt accelerated by an Order, promulgated in 1928 under the Merchandise Marks Act, that makes it unlawful to import into the United Kingdom any hen or duck eggs in shell, or to sell or expose for sale in the United Kingdom any imported hen or duck eggs in shell unless they bear an indication of origin conspicuously and durably marked in ink on the shell of each egg. Similar provision was made for placing an indication of origin on the containers of imported dried eggs. Since the issue of this Order, the misrepresentation of cheap, imported eggs as British has practically ceased.

To express the development of the industry in money values, it may be stated that, whilst the estimated value of eggs produced in England and Wales in 1913 was £5,550,000, by 1932 this figure had increased to £17,270,000, showing an addition to the nation's national income of £11,720,000, from eggs alone. These figures do not include any estimate for the production of ducks, geese and turkeys, table-poultry, feathers and manure. The value of poultry and eggs sold off farms alone was estimated, in 1932, at £19,750,000, and thus ranked third in order of importance among agricultural products, being higher than that of corn, potatoes, fruit and vegetables, or other general agricultural produce sold off the farms, but lower than that of either live stock or milk and dairy produce.

Since the War, and especially since the beginning of the present agricultural depression, British farmers have devoted much more attention to poultry-keeping, which has frequently been the most profitable, and sometimes the only profitable, branch of their farming activities. On the whole, conditions were favourable for poultry farming from the end of the War until about the end of 1931, average egg prices being higher than the average prices of other farm commodities, whilst cereal prices were low. The general trend of egg prices was downward, but prices of feeding stuffs fell even more rapidly.

The development of the specialist egg farm was also rapid after the War, partly for similar reasons, but also on account of the greater knowledge and better technical understanding of large-scale poultry farming and the problems of nutrition, breeding, diseases and management. Before 1913, there was, in Britain, scarcely one successful

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specialist poultry farm on which the production of eggs formed the main activity. To-day there are probably thousands of such farms and, whilst many of them sell hatching eggs and breeding stock, table-egg production is the main basis of their business.

The falling trend of prices for poultry produce, which, with the exception of the years 1927, 1928 and 1929, was continuous, has been largely compensated for by an even greater fall in the price of feeding stuffs. Yet, if egg prices fall below certain levels, even cheap feeding stuffs fail to compensate, since they represent only about 50 per cent. of the total cost of production. The downward trend of egg prices during 1932, though not so steep as in some of the previous years, was felt more acutely because it left the possible margin of profit uncomfortably small. Further, the world trade depression has had its effect in checking the expansion in consumption, so that in 1932 there was an estimated decrease of 6 to 7 per cent. in Britain's annual egg consumption. At the same time, egg production increased by about 7 per cent. as compared with 1931, although for the same period imports of both eggs and poultry were reduced by about 20 per cent.

The price that the poultry-keeper can obtain for his produce is a factor in his business of no less importance than the level of his costs of production. If average egg prices for the period 1911 to 1913 are taken as a datum line, indicated by an index figure of 100, then in 1932 the index figure for egg prices was 109, and for feeding stuffs 95. Egg prices were, therefore, 9 points above the datum line and feeding stuffs prices 5 points below. Feeding stuffs, however, represent only about 50 per cent. of the poultry keeper's total cost of production, the remaining half representing labour, rent, taxes and other overhead charges that are practically all higher than they were in 1911-13. Assuming that these latter costs were much the same in 1932 as in 1931, then, if an average poultry keeper in 1931 spent £100 to produce eggs and poultry that realized £120, in 1932 he would receive only £103 for the produce obtained for the same expenditure. In other words, the poultry-keeper's possible margin of profit has now been reduced to a point that leaves little margin for errors in technique or in business management. It must be admitted that these figures do not refer to the pedigree breeder of high-class stock poultry, nor to the specialist table-poultry producer;

THE BRITISH POULTRY INDUSTRY IN 1932-33

but the pedigree-breeder depends mainly upon the prosperity of commercial egg production, which cannot escape the effects of low prices and relatively high costs of production.

Now, broadly viewed, these difficulties of the poultry keeper in Britain are the difficulties of the British farmer and the British manufacturer, as they are also the difficulties of the poultry keeper, the farmer and the manufacturer in other countries. All are suffering from the effects of a world trade depression and a high cost of production in relation to the prices obtainable for their produce. These world problems raise issues that cannot be discussed here. In Britain, the poultry keeper's problems include some factors that are only national, being absent or differing in degree where other countries are concerned. Britain does not even yet produce sufficient poultry and eggs to meet the requirements of her population, for about 40 per cent. of the eggs and about 40 per cent. of the table poultry required are still imported from other countries. In 1913, the imports into the United Kingdom were valued at £9,591,000 for eggs and £992,000 for poultry. In 1932 the figures were £9,062,000 for eggs and £2,453,000 for poultry. Clearly, therefore, there is as yet no overproduction of poultry and eggs in Great Britain: but overproduction is relative and its effective definition is governed by prices and costs of production. As regards Britain, some of the eggs and poultry which she imports are so low in price as to make effective home competition difficult or impossible, whilst some of the imported poultry comes to the British market at a season when sufficient supplies of home produce at the necessary price level are not available. Climatic conditions and other factors are also involved in this question. Over one-half of Britain's import of eggs and nearly one-half the imported table poultry realize prices not far below and in some cases equal to those obtained for home produce, and the British poultry-keeper is making a big effort to compete with these imports.

Generally speaking, however, if prices for poultry produce should continue to fall in Britain without a corresponding reduction in the prices of feeding stuff and in other costs of production, then production must inevitably be reduced, since many poultry-keepers will be forced out of business. With this possible danger in view, and taking into consideration the reduction that has already taken place in the

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producer's possible margin of profit, some reference to the measures that have been taken to meet these new conditions may be of interest.

Both eggs and poultry were included within the scope of the Import Duties Act, 1932, in accordance with the provisions of which a customs duty of 10 per cent. *ad valorem* was imposed, as from March 1, 1932, on all imports of eggs and poultry from foreign countries, Dominion and Colonial produce being admitted free of duty.* As a result of the Ottawa Conference, a specific duty on eggs was substituted for the 10 per cent. *ad valorem* duty, no change being made as regards table poultry. The revised duties, applicable to foreign eggs in shell only, came into operation on November 17, 1932, and were as follows:—

(a) not exceeding 14 lb. in weight per great hundred	1s. 0d. per great hundred
(b) over 14 lb. but not exceeding 17 lb. in weight per great hundred	1s. 6d. " " "
(c) over 17 lb. in weight per great hundred	1s. 9d. " " "

On September 15, 1933, the duty on imports of dead poultry (excluding turkeys and guinea fowl) was altered from 10 per cent. *ad valorem* to a specific duty of 3d. per lb. The duty on foreign turkeys (dead) is now 6d. per lb.

It may be justly urged that the poultry-keeper's main business is to produce, but it is also true to say that unless he is able to find a market at a price that leaves him a profit, his business as a whole will fail. The producer, however, has a much greater control over the technique of his own methods than he can possibly exercise over world supplies and the consuming demand, which directly govern prices in most countries.

It may be of interest, in this connexion, to refer to some results of a costings survey, in 1931, of twenty-two poultry farms of various types in England, conducted by one of the Economic Advisory Officers. The most successful of these farms showed a profit for that year of over 12s. per bird, and the least successful farm a loss of over 2s. per bird, though these two farms were situated in the same district,

* As regards imports from the Irish Free State the duties are now as follows:—

Eggs in shell	40 per cent. <i>ad valorem</i> .
Poultry (dead):—	
Fowls, ducks and geese	4d. per lb.
Turkeys	5d. " "
Other kinds	40 per cent. <i>ad valorem</i> .
Poultry (alive)	40 " " "

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were of the same type and size, and disposed of their eggs in the same market. A similar survey for 1932, but dealing with some 56 poultry farms, showed an even greater difference in the financial results obtained. These differences represent in profits over 1s. per dozen eggs produced, and were mainly, if not entirely, due to varying degrees of efficiency in the methods of production. Yet it is probably true to say that any impartial observer would consider, and with every justification, that the average efficiency of poultry-farming methods in Britain is at least as high as in any other country.

The importance of education and research in this connexion can scarcely be over-estimated. In Britain, research centres have been established for the conduct of investigations into the many problems of nutrition, breeding, disease, and the economics of various methods of rearing, housing, fattening, etc. The National Institute of Poultry Husbandry provides higher education for the training of teachers, whilst some 52 county education authorities in England and Wales employ itinerant instructors for the purpose of giving free technical advice to poultry keepers at local centres and on their farms. The demand for these services is much greater than can be met with existing facilities. In addition to advisory work of this kind, most local authorities also conduct schemes, such as laying trials, accredited breeding farms, etc., which are mainly directed to improving the economic qualities of poultry. Laying trials have become exceedingly popular, since they afford not only a means of testing, under official control, the quality of breeders' birds, but they have become important educational centres. The accredited farms provide facilities for the supply of hatching eggs and stock birds under regulations that require a high standard of quality and freedom from disease in the parent birds.

Much voluntary work for the improvement of the industry is also carried on by numerous poultry associations, most of which conduct some educational and advisory services and in some instances publish weekly or monthly poultry journals. One of these societies has a membership of approximately 20,000, and its journal has a circulation of some 30,000 weekly. Practically all poultry associations, including specialist breed clubs, are affiliated to a central organization known as the National Poultry Council, which deals with poultry-keepers' problems from a national point

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of view and, where necessary, makes representations to Government departments, local authorities, railway companies, etc. This central council works in close co-operation with the National Farmers' Union, which takes an active interest in poultry matters.

Much attention has been devoted in recent years to the problems of marketing organization and marketing efficiency, but these problems are, in some instances, of such a nature that they can be solved only through the combined action of producers themselves and by the aid of legislation and some form of state control. Considerable progress has already been made in the direction of securing better standardization of poultry produce. In 1929, under the powers provided by the Agricultural Produce (Grading and Marking) Act, 1928, statutory grades for eggs were established, and, a little later, statutory grades for table poultry were defined. The adoption of these grades has not been made compulsory, but where the grade descriptions are applied to poultry produce on sale, such produce must satisfy the requirements of the grades as defined, and the use of the statutory grade terms acts as a warranty that the articles are of the grade stated. Home-produced eggs, that have been preserved or cold-stored, must be marked as such when offered for sale. In order to encourage and extend the sale of eggs and poultry under the statutory grades, the use of the National Mark is granted to egg and poultry packers who comply with certain regulations, which include provision for the inspection, from time to time, of the packer's premises and output by officials of the Ministry of Agriculture. There are now in operation, under this National Mark Scheme, 150 egg-packing stations and 33 poultry-packing stations; 23 of these egg-packing stations, and six of the poultry-packing stations, are owned by producers' co-operative organizations, while others are controlled by individual poultry keepers or groups of producers. In 1932, as compared with 1931, 34 per cent. more eggs were packed under the Mark and there was a further increase of 15 per cent. in the National Mark output during the first nine months of 1933, as compared with the corresponding period of 1932.

A noticeable feature of the progress of this system of marketing, during the past year, has been the development of large packing units rather than an increase in the actual number of stations operating under the National Mark

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scheme. There are now four stations each having an output exceeding ten million eggs per annum, and a further 14 whose output ranges between five and ten million eggs, compared with only three of similar capacity two years ago. These larger units are able to offer better service to the producer at a lower cost, and this tendency is likely to develop still further.

The requirement that the minimum weight of each egg must be guaranteed emphasized the need for mechanical grading apparatus, and, despite the difficulties of handling with speed and accuracy so fragile an article as an egg, it was not long after the introduction of the National Mark scheme that efficient, accurate and speedy grading machines were invented. No fewer than seven different models have been produced, of which five were invented, and are being manufactured, in this country. The most popular model—which is power-driven—can deal with as many as 5,400 eggs per hour; in fact, this country now stands in a pre-eminent position as regards efficiency in the equipment used for the testing, grading and packing of eggs.

In order to facilitate the proper marketing of National Mark eggs, especially in periods of heavy production, and with the object of avoiding undesirable price-cutting between the packers, a central sales-organization has been created which has appointed associated distributors in most of the large centres of consumption. Also, to improve wholesale distribution still further, the Ministry is proposing to institute a register of wholesale distributors who will undertake to handle National Mark eggs and to remove the National Mark labels after a certain period from the date of packing, as revealed by the code-date. Although improved egg-marketing under this scheme has made considerable progress, it is on a voluntary basis and has to meet much competition from inferior marketing methods which, since they do not incur the cost of proper grading and packing, enable slightly better prices at times to be paid to the producer. In the long run, however, such inferior methods are beneficial neither to the producer nor to the consumer, and under Section 20 of the Agricultural Marketing Act, 1933, contracts for the sale of home-produced eggs, with the exception of specified small lots, will be void unless the eggs are sold either by weight or by statutory (or National Mark) grade.

These efforts to improve marketing methods have made

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even more apparent the desirability of further organization, not only to secure a more general standardization of poultry produce, but a more controlled balance between production and consumption, a more regular and more orderly flow of supplies to the markets, and, as far as practicable, a narrowing of the wide fluctuations in prices that occur both seasonally and, as between district and district, at the same time. Further the need for organizing the processing of poultry products, such as chicken canning, etc., has become urgent.

Attempts to organize the co-operative marketing of the produce have often failed in the past because a proportion of the producers concerned, either as the result of inertia, or the possession of special facilities for direct marketing, have refused to take their proper share in the co-operative effort. To overcome this difficulty, an Agricultural Marketing Act was passed in 1931, that, subject to certain safeguards, makes it possible for a majority of producers in the whole country, or in a more limited area, to exercise a measure of compulsion over any apathetic or recalcitrant minority to secure the operation of an approved scheme of marketing. This Act enabled producers to organize themselves for the better marketing of their produce, but it did not provide for any quantitative control of market supplies, including imports.

This omission is now remedied through the Agricultural Marketing Act, 1933, which enables the appropriate Government Departments to regulate imports of agricultural products, including eggs and poultry, where such regulation is considered necessary to permit of the effective organization of the home industry; also to regulate the home output by determining the quantity, kind, variety or grade of eggs and poultry that may be sold by producers in the United Kingdom. The Act also provides for the appointment of a market supply committee for the United Kingdom, whose duty it will be to review generally the circumstances affecting the supply of agricultural products in the United Kingdom and to make recommendations to the appropriate Minister regarding any steps to be taken for regulating that supply. This Committee has recently been constituted, with the Marquis of Linlithgow as Chairman.

In accordance with the provisions of these Acts, the Minister of Agriculture and Fisheries and the Secretary of State for Scotland have constituted Agricultural Marketing

Reorganization Commissions for Eggs and Poultry, whose duty it will be to prepare a scheme or schemes for regulating the marketing of eggs and poultry in England and Wales and Scotland respectively. The Chairman of the Commission for England and Wales is Dr. C. Addison, who will also preside over a joint Commission for Great Britain, to investigate and report on the manner in which the operation of the schemes prepared by the English and Scottish Commissions may be facilitated by co-operation between the Marketing Boards set up in England and Scotland and any similar body in Northern Ireland, and by the regulation of imports.

This development foreshadows wide changes in the conditions under which the British poultry industry at present operates. The producer will be expected to become more efficient in his methods and to co-operate for the better marketing of his produce. He may perhaps have to submit to some necessary limitation of the immediate expansion of his business if the absorptive powers of the United Kingdom market as a whole do not appear to warrant such expansion. He may also have to submit to control in other directions, but the possibility of securing protection from unorganized or uneconomic competition, either from home or overseas competitors, and the greater stability in his business to be secured by this protection, should offer ample compensation to the producer for the measure of control which may be thus introduced. Price-fixation presents many problems, but in the present state of the agricultural industry, what limit can be set upon the achievements that combined and determined action may secure? At all events, the policy of *laissez faire* is not one that now finds favour with British poultry-keepers, who seem quite willing to exchange the old conditions, which allow unrestricted freedom to the individual and the free play of unorganized production and distribution, for a new policy that promises to apply a scheme of conscious control to economize forces and conditions that, until recently, were generally regarded as uncontrollable.

Note.—This paper was originally prepared in March, 1933, for presentation at the Fifth World's Poultry Congress, held in Rome last September, but has been revised in view of recent changes in the situation relating to poultry and eggs.

ANOTHER BASKET-WILLOW PEST

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WHEN the rods of certain varieties of basket willows are cut, dark patches may frequently be seen on the cut ends. These marks, often called "fleck marks," are crescent-shaped and are particularly noticeable on recently cut surfaces of the stubs. Fig. 1 shows the butt end of a stake rod (Long Skin variety) that has suffered in this way. As soon as the rods are peeled, tunnels or mines are noticed on the surface (one such burrow is shown in Fig. 2). These tunnels are restricted to the lower ends of the rods and have never been found at a height of more than about 3 ft. above the ground. In the unlikely event of the rod being peeled during August, a long, thin, white, worm-like grub may be seen in a burrow (Fig. 2).

Damage.—As a result of these tunnels, the rod is weakened and the bottom ends are usually discarded by basket makers. If the willows are being grown for cutting sets, the loss is considerable, as the thickest part has to be thrown away. Further, these tunnels are often filled with the pink grubs of a gall midge, and these grubs, together with the occurrence of rot, cause holes and cavities to develop in the rods. Thus the damage is increased.

Cause.—The makers of the tunnels are the grubs of a fly, a cambium miner (*Dizygomyza barnesi* Hendel).^{*} When full grown the grubs are nearly 1 in. in length, very narrow and white, with a black mark at the head end. It is only rarely that they are seen by growers as, during August, the grubs leave the willow stems and go down to the soil. The fly itself (Fig. 3) is of similar build to the ordinary housefly, but slightly smaller in size.

Distribution.—This fly and the damage it causes are widespread in England, and have already been found in Lancashire, Yorkshire, Hertfordshire and Suffolk.

^{*} For additional information concerning the morphology and bionomics of this fly reference should be made to *Ann. Appl. Biol.*, **xx**, 1933, 498-519.

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Life History.—The flies are on the wing during the latter part of May and in June. The females lay their eggs in young shoots at points about 10 to 12 in. from the ground. Only one egg is placed at any one point and, except when the flies are exceedingly abundant, it is unusual to find more than one egg or grub in one shoot. The eggs, which are of microscopic size, are placed inside the plant tissue in holes bored by the ovipositor of the flies. The grubs hatch about a week to a fortnight later and start burrowing just below the skin of the rods. Although the grubs do not always burrow in the same direction, their movements are generally downwards for the greater part of June and July. Sometimes they tunnel right down below the ground level even reaching quite small roots, but more often they only go as far as the stub. As they move forward, the plant tissue goes on growing over the tunnels they leave behind and so the burrows eventually become deeply embedded in the wood. The "fleck marks" are of course these burrows as seen when cut across. Towards the end of July the grubs change their direction and make their way upwards. When full grown in August and early September, they eat through the skin of the willows and go to the soil. Here they spend the winter as pupæ. Throughout their active lives, the grubs live just beneath the skin of the rods. The adults emerge in the following spring. There is only one brood a year.

Varieties of Willows Attacked.—Dark Long Skin and Green Skin, both varieties of *Salix viminalis*, are the kinds most commonly attacked. Although the grubs seem to prefer soft-wooded varieties to hard ones, they have been found on Pomeranian (*S. triandra*), Dicky Meadow (*S. purpurea*), Harrison (*S. viminalis* x *purpurea*) and Black Top (*S. triandra* x *viminalis*). In experiments, the flies have laid eggs on Cricket Bat willow (*S. cærulea*) and the grubs have developed for a period. It is very probable that normal development does occasionally take place on this last-named variety.

Control.—Unfortunately no really satisfactory artificial control has yet been found. The difficulty is that throughout the egg and grub stages the insect is well protected by the willow bark, except for the few moments it takes the grubs to leave the rods and reach the ground. The duration



FIG. 1.—Butt end of a Spruce Knob, showing "neck mark."



FIG. 2.—A tunnel caused by, and containing the grub of, the Cambium Miner.

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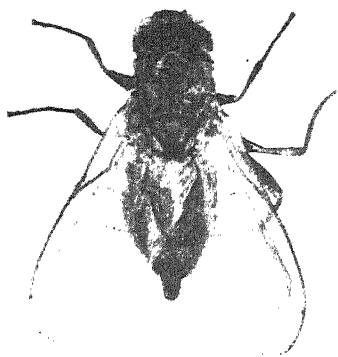


FIG. 3.—The Cambium Miner Fly: female.



FIG. 4.—A parasite of the Cambium Miner Grub.

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of the period of this migration is long, some grubs leaving the burrows at the end of July while others do not come out until after the second week in September. The egg-laying period of the adult flies is also comparatively long. Throughout the autumn and winter, the pupæ are in the soil and it is thought that this is the most advantageous time to attack this pest.

Natural Enemies.—There are two Braconid wasps whose grubs parasitize those of the cambium miner. One of these natural enemies is illustrated in Fig. 4. Although these parasites are fairly common, they do not exert sufficient control to prevent very considerable damage being done.

FOUL BROOD OF BEES

H. R. WALKER, M.R.C.S., L.R.C.P.

FOUL Brood is by far the most serious of brood diseases in bees. It exists definitely in two forms, known as (a) European and (b) American. In this paper, the European type is called *Incipient Foul Brood*, and the American, *Malignant Foul Brood*.

Incipient Foul Brood.—This, the simpler European form of the disease, has an incubation period of about three days, which explains the fact that, in this form, the dead larvæ are almost entirely uncapped. The disease affects all larvæ, and the writer has found it in a queenless stock with a laying worker where there was only drone brood. Larvæ killed by the disease are first white and glistening, and then gradually take on a yellow tint. It is quite easy, with a probe, to lift out the larvæ intact, when they are seen to have a sac-like appearance; they are easily ruptured by slight pressure.

In many instances, no change will be noticed beyond the slight yellowing mentioned above, although, in others, the larvæ become darker and finally reach a deep brown tone. A fairly heavy infection of several brood combs has been known, however, where all the affected brood were all either yellow or white; many had shrivelled and dried without changing colour.

The dead larvæ may be in almost any position, but, most often, are found forming a half crescent, and possibly lying almost at the top of the cell. They finally dry as a scale that is quite easily removed by a probe or match end. When the disease is found in capped brood, the larvæ are deep brown in colour and decompose into a fluid that has a slight viscosity.

As regards odour, this is only noticeable in advanced cases. It is unpleasant, but, while more marked, has not the scent (like hot glue) that characterizes malignant foul brood. An old, experienced bee-keeper told the writer that he could always detect the presence of the disease by the odour before opening the hive.

Infection is almost always the result of robbing from a diseased colony or from the use of old, infected combs. The

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writer has never known a healthy colony to be infected by appliances previously used in an infected hive. He has tried this deliberately in an attempt to estimate the risk, but agrees that, if any pollen or honey from the infected brood had been carried on the hive tool, the infection might be carried with it. It is undoubtedly wiser to dip the hands in carbolic solution (1 in 40) after attending to a diseased colony.

Infected honey is a grave danger; and, as one can never be sure that honey from strange colonies is not infected, it should never be used by a bee-keeper for feeding his bees.

Hives where the disease has existed should be scorched with a blow lamp, and this form of foul brood can be eradicated, in a comparatively short period, by saturation with carbolic (1 in 20) or a 10 per cent. formalin solution. Infected honey may be sterilized by heating to 80° C. for 10 minutes (White, American Dept. of Agriculture). The ground on which the hive stands is not likely to prove a source of infection.

Treatment.—If the colony affected is a weak one, or, if the honey flow is over, it is best to destroy the bees with all the combs. The rest of the hive must be sterilized as already described. The writer has carried out this operation effectively by first scrubbing the brood box with a solution of caustic soda (a lump the size of a walnut to each quart of hot water), being careful to wear rubber gloves. When all propolis, etc., has been thoroughly cleaned off, the box is then allowed to stand in the 1 in 20 carbolic solution.

Should the colony be a strong one, and the disease be present while there is a good honey flow, the treatment described later under the heading of Malignant Foul Brood should be adopted.

Cheshire and others seem to have obtained satisfactory results by spraying the combs with carbolic, izal, formalin, etc., at the same time disinfecting the quilts, brood chamber and floor boards. The writer is at present trying this treatment on a stock isolated from all other bees, his first experiment with antiseptic methods, described below, having proved a failure.

The colony, in this instance, was only lightly infected, there being a large amount of healthy brood and a comparatively small amount diseased. The measures taken were as follows:—(1) most of the diseased brood were removed by a probe wrapped round with cotton wool and

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dipped in pure izal; a little izal was left in most of the diseased cells; (2) the queen was removed and run into a clean brood chamber with 10 combs drawn out (all almost new) and the field bees joined up in this chamber, which was placed on the old stand in a new hive; (3) the old brood chamber was placed above the new but separated from it by a double frame of wire gauze; an exit was made for the bees in this old brood chamber so that all the foraging bees could return to the stock below. Every four days, the quilts were wetted with izal solution (one teaspoonful to a quart of water) and the bees in the upper brood chamber were fed with izal medicated syrup.

The experiment, however, failed. At the end of three weeks, there were 3 infected combs in the lower brood chamber and one comb of quite healthy brood. The infected combs had only a few diseased larvæ but the disease was present.

No antiseptic treatment can be recommended unless the bee-keeper can carry out treatment in such a way as to obviate any risk of infecting neighbouring colonies. Even then, he must be prepared to give much time and attention to the spraying and disinfecting; the writer endeavours to clean out each infected cell. It is a moot point, however, whether, until research has revealed a really effective treatment, it is not better to destroy the stock or to treat as if it were infected with Malignant Foul Brood.

Malignant Foul Brood.—This, the American type of the disease, is due to a spore-bearing organism (*Bacillus larvæ*), the spores being extraordinarily resistant to all antiseptics and even to boiling in water for 20 minutes. Diagnosis of the disease is by no means easy, even to experienced bee-keepers, "in the early stages." The writer has seen a strong stock examined at a practical demonstration and heard it praised as an ideal stock; yet, on careful examination, several combs were found to be infected.

With an alarming increase in this form of the disease, the possibility of infection must always be borne in mind. One should be prepared to brush the bees lightly off the brood combs so that each comb can be thoroughly examined. If the disease is present, a few sunken or perforated cappings may be seen; or there may be a few scattered, apparently-normal capped cells on a comb that contains only young

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brood. If there is doubt, there need be no hesitation to puncture the capping, when the disease will manifest itself by the presence of dead larvæ or a thick brown viscid fluid.

The incubation period of *Bacillus larvæ* is about seven days, and, for this reason, the disease is almost always found in capped brood. As a rule, only the worker brood is found diseased, but both the drone and the queen larvæ may be infected. In late infections, the diagnosis is easy; the whole stock has become weak and the brood combs are easily examined. They will present an irregular appearance, some of the cappings having been removed by the bees, while others will have sunk, and a few will be perforated by minute holes.

The contents of most cells will be the viscid brown fluid, previously mentioned, which will adhere in threads to a matchstick when introduced into the cell. In advanced cases, there is a characteristic ("hot glue") odour which is most unpleasant.

Treatment.—Once the disease has been diagnosed, there are only two methods of treatment:—

- (1) If the stock is already weak, or if the honey flow is ending, the stock should be destroyed with petrol or by burning sulphur. The whole contents of the hive should also be destroyed. The hive itself may be kept, but it must be thoroughly disinfected. The best method is to treat it (as previously described) with caustic soda, and then completely to flame the interior by means of a painter's blow lamp.
- (2) If the colony is strong, all the bees should be carefully brushed (not shaken) on to a hiving board covered with newspaper (which is afterwards burnt), and allowed to run into a well-ventilated box that can be effectually closed after all the bees are hived. The box should be placed in a cool shady spot for 48 hours and then be treated as an ordinary swarm, running them on to clean combs, and feeding them freely with syrup, which may be medicated.

Antiseptics have proved practically valueless for disinfecting either colonies or combs. In our present state of knowledge, formalin alone appears to have any value, but, at the strength required to be effective, it is fatal to the bees, although it may be used to disinfect combs. For this

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purpose, a 20 to 40 per cent. solution should be used, the combs being immersed in it for 48 hours. It is a troublesome operation, needing great care, and the result is even then doubtful. Accounts of this method have been published in the principal British and American journals devoted to bee-keeping, e.g., the *British Bee Journal* of May 15, 1930.

The following experiments carried out by the writer indicate that advertised specifics are valueless. Five strong, healthy stocks were infected from a diseased stock by the introduction either of infected honey from the brood chamber, or of a few of the infected cells. In this way, counting the original infected stocks, there were six diseased stocks to work upon.

- (a) Two of the stocks were treated by washing the floor boards with a 10 per cent. formalin solution every six days; the infected cells, as detected, were wiped out with cotton wool soaked in formaldehyde (35 to 40 per cent. formalin); the quilts were damped with a 5 per cent. formalin solution; and eight tablets of an advertised cure for foul brood were placed in each brood chamber. Many bees were killed by the formalin at the strength used (most probably by the disinfection of the cells), but the disease spread so rapidly that, at the end of five weeks, the stocks had to be destroyed.
- (b) Two other stocks were treated with carbolic acid, pure carbolic being used to destroy infected cells; the floor boards and quilts were treated with a 1 in 60 solution; the combs with no brood were lightly sprayed; eight tablets of the so-called cure were placed in each brood chamber. The results were similar to those in (a).
- (c) The two remaining stocks were treated on similar lines, except that pure izal was used for the infected cells, a solution (one teaspoonful of izal to a quart of water) being used for the floor boards and quilts. The results were similar to those of (a) and (b).

In these experiments, all the hives contained infected honey, which was only lightly sprayed with the different antiseptics. The negative results, in the writer's opinion, go to prove that it is hopeless for the ordinary bee-keeper to attempt the treatment of infected stock except by the method of swarming described above.

Preventive Measures.—The unsatisfactory results of remedial treatment make the question of preventive measures against both forms of foul brood of the utmost importance. The following warnings may be given:—

- (1) Do not use old, black combs; replace all old and defective combs at each spring cleaning.
- (2) Never feed bees with honey unless its source is known to be above suspicion. Many beekeepers have started the trouble by using advertised feeding honey sold at absurdly cheap prices.

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- (3) Avoid throwing unwashed bottles that have contained honey into the dustbin or on the rubbish heap; the bottles may be visited by your own or a neighbour's bees.
- (4) Every county has a bee association, also a technical adviser; either will arrange for an expert examination of your bees, and the advice obtained will, more than anything else, help you to obviate risk of the disease.

Unfortunately, one often finds that some bee-keeper, having lost his stock through the disease, leaves the hive and its contents standing for all robber bees to visit. Every effort should be made to bring home to bee-keepers the terrible danger of these diseased hives. The worst offenders, in the writer's experience, are the small bee-keepers; the large commercial firms, who rely on the honey harvest, are too experienced to run such a risk. In one instance that came under the writer's notice, every stock in a large village was destroyed by foul brood as the result of robbing from an old diseased hive. As a last warning, anyone who buys bees should insist upon a guarantee that the bees and their brood are free from disease.

NETHERLANDS ONION INDUSTRY

THE reputation enjoyed by the Dutch onion in this country is based largely on the serviceability of the brown onion of the "Up-to-Date" type. This variety, which reaches the English consumer to a certain extent as a pickled product, but to a much greater extent as the ordinary culinary onion, accounts for the greater part of the onions grown in Holland. It is similar in type to the "Ailsa Craig," "Bedford Champion" and "Up-to-Date" varieties grown in this country.

The popularity of the Dutch onion is due in no small degree to the reputation for efficient grading already established by the Netherlands trade, the dependability of recognized marks and types of packages constituting a highly important marketing factor. The uniformly high quality of the Netherlands consignments is ensured by a compulsory inspection system, operated by the Export Control Office in close co-operation with the trade. With the exception of preserved onions, "Silverskin" and Spring onions, all consignments of onions for export must be accompanied by a certificate—supplied to packers after an official inspection—stating that the onions conform in all respects to the specifications laid down by the Control.

According to the latest decree, onions intended for export must be of Netherlands origin, sound, free from frozen specimens, ripe, dry, properly trimmed and reasonably free from soil. It is also provided that only onions of the same shape and grade may be packed in any one container. The containers specified are strong sacks or bags of 50 or 25 kilogrammes net; but other suitable sacks may be used if the exact net weight is clearly stated thereon.

Official Grades.—The grading scheme is well adapted to the requirements of the export market. The grades normally applicable to unpreserved onions are as follows:—

- | | | | |
|--------------|-----|-----|------------------------------|
| (1) Picklers | ... | ... | Up to 35 mm. in diameter. |
| (2) Medium | ... | ... | 32 to 43 mm. „ „ |
| (3) Ordinary | ... | ... | 40 to 75 mm. „ „ |
| (4) Large | ... | ... | 70 mm. and over in diameter. |

The ordinary or ware grade is the grade most in demand in England, consisting exclusively of the brown onion of

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"Up-to-Date" type; it accounts for 60-70 per cent. of the onions exported to the United Kingdom. The pickler is next in importance in this respect, while the medium grade—a residue formed by elimination from these two grades—has little value for commercial purposes. The large grade, consisting of ordinary brown super-culinaries, accounts for a comparatively small proportion of the total graded—in a normal year approximately 2 per cent.

Other Important Varieties.—The so-called "Summer" onions, generally of "Ailsa Craig" type, are distinctly larger than the ordinary brown. Grown from sets planted in the spring, they mature in July, a month or more before the main onion crop is harvested. The following special grades have been provided for in this category:—

- (1) 50 to 72 mm. in diameter.
- (2) 70 to 92 mm. „ „
- (3) 90 mm. and over in diameter.

The small, white "Silverskin"—a pre-eminent pickling variety—is not subject to compulsory grading. It is, however, carefully graded by briners with respect to colour, shape, damage, etc., to meet the needs of pickle manufacturers. Grown for the most part under contract with brining factories, it is used mainly in high-grade pickles. Commercially, however, it is suffering somewhat seriously from competition from the less expensive pickling varieties, but more especially from sauces, salads, mayonnaise, etc.

The "Yellow Knap," though graded similarly to the ordinary brown, deserves mention by reason of its use for pickling. Like the more expensive "Silverskin" which it is tending to displace, it retains colour and firmness in vinegar; but it, too, must meet the competition of the cheaper products.

Machine Grading.—In Holland, by reason of the large supplies handled, particularly for export, the mechanical grading of onions is a matter of very great importance. A grading machine, which is both efficient and economical, is now in fairly common use by exporters. A single-unit type, which is driven by a $\frac{1}{4}$ -h.p. electric motor, is capable of grading 35-50 cwt. of onions per hour; while a double-unit type, when driven by a $\frac{1}{2}$ -h.p. motor, will handle 80-100 cwt. per hour. An interesting feature of the

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machine is that it is capable of easy adaptation, by the use of additional racks, for either tomatoes or potatoes.

Less efficient grading contrivances, occasionally of a hand-made variety, are, however, still used on certain farms.

Storage.—Under the conditions of the Netherlands trade, great importance attaches also to the question of storage. The onions are usually kept under contract on the farm until required by the merchant. Formerly, they were stored in pits or clamps; but this method, though it enabled onions to be kept in good condition throughout the winter, has been superseded by the better method of storage in "rents." A "rent" is a simple shed-like structure made with laths and wire netting. The roof is thatched, but apart from this the onions are exposed to the elements except in frosty weather, when the sides of the rent are covered with straw. Sweating, with its deteriorating effects, is avoided by the free circulation of air which this method of storage ensures. The method is a comparatively recent development. It is largely responsible for the prolongation of the marketing season, so that, in varying quantities, onions are exported from Holland all the year round.

Yield.—The competitive position of the industry is assisted by the high yields obtained by the Dutch grower. This year, some growers report yields of over 20 tons to the acre, i.e., more than twice the average yield for the country as a whole. These high yields are for the most part obtained with good dressings of nitrogen. The Dutch soil, though light and sandy, does not require large quantities of farmyard manure—commonly used on onion-growing areas in Bedfordshire—owing to the presence of a high water table.

While favourable growth conditions, supported by a suitable storage system, provide an important basis for the Dutch onion industry, efficient grading with the aid of up-to-date machinery, careful selection of seed strains in the light of grading requirements, and an effective system of quality-control in regard to export shipments, afford important commercial advantages.

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THE Forty-first Meeting of the Council was held at the Middlesex Guildhall, Westminster, on Tuesday, December 5, 1933; *Mr. George Dallas* in the Chair. At the opening the Chairman reminded the Council of the great loss that Agriculture and the Council had sustained in the death of Sir Walter Berry, K.B.E., J.P., who had been a member of the Council since its inception in 1920-21. A vote of condolence and regret was passed, with instructions to the Secretary to convey it to the late Sir Walter Berry's family.

Insecticides and Fungicides.—*Mr. Clement Smith* (Suffolk), Chairman of the Standing Committee, moved the adoption of the Report of the Committee on "The Declaration of the Constituents of Insecticides and Fungicides" (see Appendix I, page 947). *Mr. W. R. Smith*, *Mr. F. Sole* (Isle of Ely), *Sir Douglas Newton*, K.B.E., M.P. (Cambs) and *Mr. H. E. S. Upcher* (Norfolk) spoke in favour of the Report, and *Sir C. J. Howell Thomas*, K.C.B., C.M.G., Permanent Secretary to the Ministry of Agriculture and Fisheries, on behalf of the Ministry, said that the Department was fully alive to the importance of the Report, and would do what was possible in the matter. Legislation would, however, be necessary to deal with the matter effectively, and the success of legislation would depend, at least in part, on the operation of some such testing station as the Report suggested. The Report was adopted.

The Beef Position.—*Sir A. G. Hazlerigg*, Bart. (Leicester), moved the adoption of the Report of the Standing Committee on "The Beef Position" (see Appendix II, page 948). *Sir Arthur* said that it was curious that the Government should have been so slow to see that the foundation of prosperity in agriculture is in live stock. To start by helping the arable farmers with the wheat quota and sugar-beet subsidy, and horticulturists with tariffs, was starting at the wrong end. These measures, however, had certainly been a very great help to those parts of England which were in the worst condition of all two years ago.

Immediately before the Ottawa Conference the advice of prominent agriculturists had been asked and given. That advice advocated a system of quotas and tariffs combined.

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Someone else, either through ignorance or malice, made it a question of quotas against tariffs, and quotas were chosen. Agriculturists were not told why import duties were not good for beef and mutton, especially when combined with quotas, whilst they were so good for iron and steel, manufactured goods, or tomatoes, or strawberries. Referring to page 54 of the Ottawa Agreements Act of 1932, one saw there a satisfactory cut of imports of frozen mutton and lamb and frozen beef. One would imagine that, with a restriction of 10 per cent. from January to March, 15 per cent. in the next quarter, and 20 per cent. in the next of frozen beef, there would be less frozen beef coming into the country. Curiously enough 57,000 cwt. more frozen beef had come in during the first nine months of the year, owing, he understood, to some peculiar arrangement whereby foreigners imported beef cuts outside the total. That, he understood, was now no longer a possibility. The imports of chilled beef, although to be maintained at 100 per cent., had since been cut, for which agriculturists were extremely grateful to the Minister. As regards New Zealand and Australia, their shipments of frozen mutton and lamb were to be maintained at a high figure. As regards frozen, or chilled, or live cattle, none of the Dominions had any restriction put upon them at all. If the terms of the New Zealand Agreement on page 55 of the Act were examined, one would find that an understanding had been arrived at between the Governments as to their sendings. It was expressly stated that the New Zealand exports were estimated for the season 1932-33 at no more than 440,000 cwt. for the year. The trade figures of receipts from New Zealand in the first ten months of this year show 661,000 cwt., or 11,000 tons more than it was said she would export. This meant either that there had been an entire miscarriage of intention, or it was the most gigantic bluff ever put up to blind the British farmer. Sir Arthur then referred to the possibility of assistance by feeding the Home Forces on home-produced beef. This had many times been asked for by the Council and many times refused. The Council had been told that the beef used was frozen beef and the contract was given to Australia and, if altered, was asked what would become of Australian meat? That, he submitted, was not the affair of the British farmer. It was for the Government to implement its pledge that the British farmer should have the first call on his own market.

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The Minister had said that the Government would not cease its efforts on the beef question, and that there had already been a reduction of foreign imports of beef, of 15,000 tons of chilled beef and 8,000 tons of frozen beef in one quarter of this year. But what about the thousands of cattle coming over from Canada and the 10,000 extra tons from New Zealand in the first ten months? Here, *the Minister* reminded the speaker that the 15,000 and 8,000 tons referred to last quarter and not to the ten months. *Sir Arthur* asked how much of that extra 10,000 tons was now in cold storage? The whole situation, he said, proved how comparatively useless quotas alone on beef importation could be. Though, for instance, there were quotas on foreign beef there were no quotas or any restrictions on foreign offals. There were no restrictions on fat cattle from Canada, and there was apparently no attempt to keep New Zealand to her promise. Prices certainly had not gone down during the last nine months, but that was not enough. He very much hoped that the Minister would be able to do something in the near future and would not wait for the Report of the Reorganization Commission, which, he understood, was not now likely to issue its Report before February.

Mr. T. Byass (Yorks, E. Riding) deplored the fact that the Report did not give more specific advice. He thought that some of the material in *Sir Arthur Hazlerigg's* speech should be in the Report. The suggestion that there should be an amendment of the Ottawa Agreement seemed outstanding. *Mr. J. P. Terry* (Gloucester) agreed with the last speaker. Things were very bad in the industry; he had been a grazier all his life and had never known so much depression. Altogether, it meant a great loss of capital to the agricultural community. *Mr. W. W. Sampson* (Dorset) said that now we were no longer able to pay for food imports in manufactured goods, it was necessary that we should grow more and more food stuffs and have agreements such as the Ottawa Agreement, with artificial means of protecting and keeping our own markets alive in this country. *Mr. J. O. Adams* (Northants) also considered that the Report should have put forward a concrete suggestion. He thought that unless something were done as to a guaranteed price for beef, grazing in the Midland Counties would disappear. He asked that the Government should consider the meat question on the same lines as they had already considered and dealt with the wheat question. *Mr. R. P.*

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Allsebrook (Leicester) agreed with the last speaker. One farmer he knew had grazed 300 bullocks this season and was losing £3 a head on them. If the feeder went out, the rearer would soon follow. The question was vitally important to the grass counties, where the men were in a desperate state; in many cases the banks would not advance any more money. *Mr. Christopher Turnor* said he hoped that the Council would not set its face against the quota system, which was still in its trial stages. It was necessary to restrict mutton and lamb as well as beef. He was not, however, in the least opposed to tariffs; he would support any system which would effectively control importations.

The Rt. Hon. W. E. Elliot, M.C., M.P., Minister of Agriculture, in the course of his reply, said that if he might sum up the discussion the Council's view was contained in the single slogan, "It is the beef man's turn now." He would take that as an instruction from the Council in dealing with the situation as he saw it. He did not agree that it was either through ignorance or malice that steps had not been taken before to deal with the beef position. After all, in previous years every branch of agriculture had pressed for wheat to be dealt with. He himself was a live-stock man and he had looked rather glumly at this concentration on wheat. Well, wheat had been dealt with and nobody denied that the method adopted had been practical and satisfactory. The difficulties in dealing with live-stock products were very much greater than the difficulties in the case of wheat. Some 70 per cent. of British farming was based on live stock and live-stock products, and the situation in regard to some of those was changing very much more rapidly than the situation in regard to wheat. In fact, the crisis in live stock was of relatively recent origin, and it was that rather than any intentional default that had decided the order of things. In live stock there was not merely the great home productions to consider, but the great imperial productions as well, and enthusiastic advocates of absolutely unrestricted imports from the rest of the Empire appeared rather to have led astray agricultural opinion in the past. This morning nobody had even dared to suggest Empire Free Trade as the way out. He took it as a message from the Council that it insisted upon the desirability and the necessity of some organization of imperial supplies as well as of foreign supplies if the home agriculturist is to survive. (He put that point to the

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Meeting, which was unanimously agreed, there being no voice to the contrary.) The suggestion of the regulation of overseas importations came up at Ottawa, and it was not possible to leave that Conference saying that the Empire had failed to come to an agreement and that the whole great imperial dream was at an end. At Ottawa, an agreement had been reached, and he would point out that, in the minds of those negotiating, the difficulty now before them had been foreseen, and, in meat alone, the position was safeguarded as was that of no other agricultural product. In June of next year the Ottawa meat agreement would come to an end and new arrangements would have to be negotiated. That was not so with dairy products or with bacon. Now, the Council said, "That is all right but what are we to do in the interim"? and here he paid a tribute to the Standing Committee of the Council and to the mover of the Report, because he thought that it would have been injudicious of the Council to come down 100 per cent. on any particular solution for our present ills. He thought the Report a statesmanlike document, which summed up the situation and placed the responsibility where it must lie, i.e., with the Government. He accepted that responsibility. He was not going into the statistical position again, or here to analyse the previous steps which had brought the position where it now was. He thought that a good defence might be put up to criticism, but that, after all, was water which had run under the bridges. The real question was what is going to happen in the future? It would be quite impossible for him to-day to say more than that he was receiving the Report in the spirit in which it had been put forward. He admitted its contentions and, as Minister, he appreciated the situation and would do his best to grapple with it.

The Report was adopted.

Horticultural Industry and Import Duties.—*Mr. Cecil Robinson* (Holland, Lincs) moved the adoption of the Standing Committee's Report on "Improvements to the Horticultural Industry in connexion with existing Import Duties" (see Appendix III, page 949). He drew attention to the salient features of the Report and said he thought the Council would agree that growers of horticultural products were proving that the Government had been justified in imposing the duties. The amount of labour employed had

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been very much increased, and if the Government further encouraged intensive growing of fruit and vegetables another half-a-million hands would be taken on the land.

The Report was adopted.

Statement by the Minister.—The Chairman then invited the Minister to address the Council on the general agricultural situation, and *the Minister*, in the course of his remarks, said that the Council was reaching a stage where its work would become of greater and greater importance, because when an active period such as the present was reached, close and continuous touch between the Minister and all sections of the industry was essential. The Agenda of the Council foreshadowed discussion of certain very interesting and important matters. In it, the Potato Marketing Scheme was referred to: only last night had the Potato Marketing Scheme been laid before the House of Commons. On another item, the Bill to give legislative sanction to the proposals between the Pigs and Bacon Boards was down for December 7.

It might interest members of the Council if he went over some of the points of importance which he had raised in the House in the Debate on the King's Speech.

First, there was the question of the extent to which we were already producing foodstuffs at home. He was aware that the figure came as a surprise to many people, and he would repeat that to-day British agriculture produced food for approximately 20 million people. His authority was the Agricultural Output of Food Supplies of Great Britain based on the period 1924-27. There it was seen that the home production of wheat and flour was approximately 15 per cent. of the total consumption, meat 44 per cent., poultry and eggs 49 per cent., and dairy produce 48.7 per cent. Potatoes, other vegetables, and raw fruit was 62.4 per cent. The total of these principal food commodities worked out at 44.1 per cent., and 20 million represented about 45 per cent. of our population over the same period as that covered by the figures. If fish were included the percentage became 44.91 per cent. The number of persons engaged in agriculture was approximately 1,200,000.

These facts stressed again the enormous importance of agriculture as a factor in the productive life of the country, and he drew attention to the fact that the margin for expansion was smaller than one would at first sight suppose.

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That, however, did not mean that we should not produce more food at home, or that we should not settle more men on the land. It did mean, however, that we should face up to the consequences. It was true, also, that we might expect an expansion of food consumption as the country became more prosperous and a higher standard of life was achieved. We could not allow action to stand still in one field because we are afraid of handling everything at once. A change over from the less expensive to the more expensive foods would create a greater outlet for more expensive produce. He had said many times that the trouble of agriculture is the problem of prices, and the Government's declared intention is to restore more satisfactory wholesale price levels. The Government's task, however, was not finished when that was achieved. There was then a new set of problems with a direct bearing on land settlement and drainage policy, marketing and organization. There was the economic balance of agriculture in relation to the conditions of our people, which still remains far and away the most important problem alike for agriculture and every other industry. We were, however, still in the initial stage, which, he repeated, was all that the problem of prices really was. The Minister was thanked for his statement.

Contagious Abortion.—*Major F. H. Fawkes* (Yorks, W.R.) moved the following resolution on behalf of the Standing Committee:—

"That the attention of the Council be called to the ravages of contagious abortion in the dairy herds of the country, and that the Ministry of Agriculture be asked to state what steps are being taken to combat the disease."

Major Fawkes sketched the serious position in regard to the disease and asked whether there was any remedy and what steps the Council would recommend the Ministry to adopt in regard to it, whether by legislation or otherwise. He suggested that the matter was one which the Standing Committee might go into thoroughly, and that, at a future date, the Council might consider its Report. *Major R. G. Proby, M.C.* (Hunts), seconded Major Fawkes' suggestion, and it was agreed that the matter stand referred accordingly to the Standing Committee.

The Warble Fly Pest.—*Mr. W. Hearle* (Cornwall) moved—

"That this Council urges the Government to make the treatment of all cattle in the United Kingdom for Warble Flies compulsorily." He said that this matter had been considered by his Diseases

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of Animals Committee, by the Agricultural Education Committee, and by the Agricultural Committee, and the terms of his resolution had been confirmed by the County Council. The folly of neglecting the question of damage done by Warble Fly had been fully realized in Cornwall, as well as the necessity of seeking a means of combating the evil. He suggested that this question also might be referred to the Standing Committee. *Mr. W. Lanyon* (Cornwall) seconded the suggestion of reference to the Standing Committee. This was put to the Council and agreed.

Retail Milk Prices.—*Mr. Christopher Turnor* moved—

“ That this Council considers it desirable that the Milk Marketing Board or other competent authority, or authorities, should be invited without delay to take steps to check the unwarranted increase which is taking place in certain districts in the retail prices of milk.”

He said that not only were increases in certain districts unwarranted, but they were primarily due to the action of the Milk Marketing Board. This was very serious and was in spite of the fact that the price to the producer had been reduced. The present situation was that distributors in his district now had a difference of 11d. between wholesale and retail prices as compared with a former 8d. Most of the distributors were quite willing to sell at the old price. If this action were widespread throughout the country serious discredit would redound to the Milk Marketing Board, and unless immediate steps were taken producers would be hit by the reduction in the consumption of milk. *Major Proby* seconded the motion. *Mr. C. H. Roberts* (Cumberland) said that he did not see why action could not be taken by producers themselves. The raising of the retail price was done by the retailers: they had tried it on in Cumberland, and the National Farmers' Union saw the retailers and the original prices were restored. He believed that this sort of action would be taken by any body of retailers. They all would want to keep to the old price and could do the re-arrangement by themselves. The resolution was put to the Council and adopted.

Purity of Milk Supply.—*Mr. C. H. Roberts* moved—

“ That the Report of the Public Health Committee of the London County Council on the London milk supply, showing that 83 per cent. of the milk arriving in London in glass-lined tanks contained tubercle bacilli, is seriously disquieting:

That commercial pasteurization of milk cannot be relied on in all cases to kill tubercle bacilli; and that the demand for a milk supply which is clean, uncontaminated and non-infective in its

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natural condition is a very proper one and should be met as far as possible:

That the Council requests the Government to work out a scheme for establishing accredited tubercle-free herds, providing free tuberculin-testing and without charging licence fees, so as to create accredited tubercle-free areas on the lines of the experiment financed by the Medical Research Council in Ayrshire."

Mr. Roberts sketched the present position whereby about 50 per cent. of the milk coming to London came in glass-lined tanks, which meant that $6\frac{1}{3}$ per cent. of the total milk supply, and probably more, was tuberculous before it reached the customer. Those who had put many thousands of pounds into pasteurizing plants were ready to assure people that pasteurization was a safe remedy. His County Authority had found that it was not. In the laboratory it might be reliable, but under commercial conditions it was not so. There was the question of frost and pockets of milk which did not get uniformly treated, and there was the tendency not to raise the milk to the higher level of temperature because then the cream line was destroyed and, on the whole, it would not do. He believed that the right way to eradicate tubercle was to build up tubercle-free herds. In the first place, the fees for inspection of these herds should be dropped. Counties had no power to spend money on free tuberculin testing. His county was, however, spending £2,000 a year on surgery for tuberculosis due to infection, and that was a very inadequate amount having regard to the loss of child life. At least 1,000 children die annually from infection due to milk. In the circumstances, he thought it was worth while trying to get larger experiments in accredited herds on the lines of that in Ayrshire and financed by the Medical Council. It was short-sighted policy to spare money in an effort to eradicate this disease and spend enormous sums on what is no more than a mere palliative. *Mr. A. E. Bryant* (Bucks) seconded the motion. He said he had had more tuberculous cows to deal with than, he thought, any man in the country. His grievance was that these cows did not come along until they were in the last stage. He asked what encouragement the Government gave to farmers to report tuberculous cows: The valuation of the veterinary inspector is, say, £4, the Government instructs the County to give 30s. for the animal and there is, thus, no encouragement to poor farmers to report. The sum which the Government formerly allowed was 50s. in his County. The dealer provided the alternative market and gave the farmer £4 for his tubercu-

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lous cow. Where do these cows go? The bigger part of them for human consumption. If the County Council gets an animal for 30s., what happens to it? Does the Government know? *Mr. J. M. Eady* (Northants) said he was surprised at the remarks of the last speaker, who said he was on the Animal Diseases Committee in his County. If such things were going on in his County he should be ashamed of being on that committee. He himself was Chairman of his County Animal Diseases Committee, and every cow that showed signs of tuberculosis would have to be reported. If the farmer did not report, he would be prosecuted. *The Rt. Hon. Sir F. D. Acland, Bart., M.P.*, asked if it were not a fact that there was a very powerful Committee now sitting on the question of animal diseases. *Sir Charles Howell Thomas* replied that there was a Sub-Committee of the Economic Advisory Committee now considering the tremendous problem of disease in animals. He had reason to know that they had had before them evidence on the question of tuberculosis eradication, and the Ministry was looking forward to seeing their Report in the very near future. *Mr. Roberts* said that in the circumstances he would withdraw his motion which, if necessary, he could bring up again. The motion was, by leave of the Council, withdrawn.

Potato Embargo.—*Mr. F. Sole* moved—

"That owing to the unforeseen delay in setting up a Marketing Scheme for Potatoes, and the doubt which exists as to the possibility of any such scheme functioning during the remainder of this season, this Council of Agriculture urges the Ministry to endeavour to arrange for the restriction of importations of all old potatoes as from January 1 next."

Mr. Sole drew attention to two particular points: first, the setting up of a Potato Marketing Board and, second, the fact that there were sufficient potatoes in the country for all requirements. As regards the first point, the scheme had been delayed by the action of a small handful of Scotsmen and could not now come into operation for some time. It appeared necessary, therefore, that the importation of old potatoes should be restricted until such time as it did operate. It would be a source of satisfaction to those people who had lost large sums of money on the previous season's crop to know that they were not to lose further heavy sums now through the dumping of foreign supplies. *Mr. Cecil Robinson* seconded the resolution, and *Mr. J. T. Briggs* (Soke of Peterborough) and other speakers also sup-

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supported it and joined in the debate. *Sir Charles Howell Thomas*, for the Ministry, said that the position had been very materially altered since the resolution was placed on the Agenda. The Potato Marketing Scheme was now before Parliament, which would be invited to pass the necessary legislation before the Christmas Recess. If the consequent steps were taken promptly, the scheme could be brought into complete operation in due course. There was no fundamental reason why the Government, if they were so minded, should not proceed with a further arrangement to control the importation of potatoes after the period of the existing agreement had expired. The resolution was passed.

Pigs Marketing Scheme.—*Mr. T. C. Ward* (Salop) moved—

“That this Council strongly deprecates the proposal to make deductions from pig producers’ returns during the next contracting period for the purpose of covering any portion of curers’ alleged losses at the present time, believing that such deductions would directly violate a principle in the original scheme upon which pig producers so recently voted, that they would be looked upon as a definite breach of faith and have a serious effect upon the expansion of production.

Alternatively, if such penalties are inflicted, then pig producers must be allocated a share of profits when the import price of bacon rises beyond the estimated basic figure calculated in the original scheme.”

He thought that everyone would understand the cause of the resolution, which was the lending of half-a-million to the Marketing Board to cover the alleged losses of curers in the contracting period, to be repaid in the next contracting period by mulcting the producer. He was a working farmer and would say that there was considerable resentment and a great deal of distress caused by the proposal. About the 1st of each month in 1933, the prices of Danish bacon purchased by one of our largest firms were as follows: January, 52s.; February, 55s. 6d.; March, 55s. 9d.; April, 57s. 2d.; May, 81s.; June, 53s.; July, 71s.; August, 79s.; September, 89s.; October, 84s.; November, 76s. He suggested that curers had not suffered anything like the loss that had been suggested, and that there had been a good deal of dust thrown in the eyes of the Minister. The atmosphere of distrust and unfair treatment should, in the interests of the scheme and of production generally, be dispelled at the earliest possible moment by the withdrawal of the proposal to dip into the producer’s costs to cover someone else’s alleged losses. The logical converse of the

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action was to let the producer share in the curer's gains when he made them, but that they really did not want. The whole business should be based on the cost of production, and that should be covered with a reasonable profit. *Mr. H. E. S. Upcher* seconded, and *Mr. H. W. Thomas* (Hants), a member of the Pigs Marketing Board, stated the position which had arisen in November when the question of a loan came up. He strongly supported the decision which had been come to by the Boards and the Ministry. *Mr. R. Bruford* (Somerset) supported Mr. Thomas. *Sir Charles Howell Thomas* said that the arrangement was a voluntary one between the Pigs Board and the Bacon Board made in consultation with the Minister. It was freely made by both Boards, and the position was that a number of contracts had been offered on which the supply of pigs was greater than had been anticipated. No definite contracts had, however, then been made. It was quite possible that unless some such arrangement as the present one had been made, there would have been no binding contracts. The arrangement, therefore, was to tide over a serious difficulty. Whatever else might be said it was quite clear that an advance to the Bacon Board would have to be repaid by the Bacon Board, and if that necessity were followed through to its logical conclusion, the repayment must inevitably come out of the price payable to the producer. There was no justification for the suggestion that dust had been thrown in the eyes of the Minister.

The maximum sum involved was some half-a-million, to be administered by representatives of the Pigs Board, the Bacon Board, and three Government nominees, with Sir Wyndham Portal as Chairman. The Council could have confidence that this Committee would not allow the fund to be raided. He was inclined to hope that this resolution would not be adopted. As far as that part of the resolution dealing with participation in the profits of the Bacon Board was concerned, he supposed it would not be impossible at some future stage to contemplate a co-operative contract between curers and producers, but on that he would not express any views.

Mr. Ward, in reply, said that apparently the producers, through the National Farmers' Union, were not consulted at all. His emphatic suggestion was that the scheme, so recently put before the producers and voted on, did not contain one word of the producers having to carry any-

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one else's losses, and the suggestion was not equitable. *Sir Arthur Hazlerigg* suggested that the matter might be referred to the Standing Committee for further consideration. This was agreed.

APPENDIX I

REPORT FROM THE STANDING COMMITTEE OF THE COUNCIL OF AGRICULTURE FOR ENGLAND ON THE SUBJECT OF REQUIRING A DECLARATION OF THE CONSTITUENTS OF INSECTICIDES AND FUNGICIDES

1. On May 6, 1932, the Council passed a resolution in the following terms:—

“ That fungicides used for the spraying of potatoes and other crops should be made subject to similar regulations as are imposed by the Fertilizers and Feeding Stuffs Act, 1926.”

This resolution was then left in the hands of the Ministry of Agriculture. Since that date, certain Agricultural Committees have made representations to the Council to the effect that sprays and washes applied to the fruit and vegetable crops in their districts have been ineffective, and the authorities apparently suspect either a low standard of purity in the chemicals used, or an inadequacy in kind of the constituent chemicals to perform the tasks allotted to them.

2. The Standing Committee has been informed that the Ministry has for some time been negotiating with representatives of the manufacturers of insecticides and fungicides, and that an understanding as to declaration of quality of certain standard chemicals used as insecticides or fungicides has been reached, but that it has not been found possible to separate insecticides and fungicides, where they are proprietary preparations, from the large mass of proprietary preparations, patent medicines, etc., as to which it would be impracticable to require a declaration as to ingredients.

3. The Standing Committee suggests to the Council that it should request the Ministry to be so good as to make a statement of the present position of the matter so that growers should know how far it has been possible to assist them in respect of a declaration of quality of certain standard chemicals, and of the reasons which apparently make it impracticable to apply similar regulations to all insecticides and fungicides as are imposed in the case of fertilizers and feeding stuffs under the Act of 1926.

4. The Committee also suggests that the time has arrived when a central institution, set up for the purpose, should analyse and report upon any proprietary insecticides and fungicides submitted to them as to the normal effectiveness of such compositions, i.e., that these are capable of carrying out the operations for which they are advertised and sold. If such an institute could be set up, the Committee feels sure that much of the difficulty that has been experienced by growers in making a proper selection of insecticides and fungicides for their particular purposes would disappear, and the feeling of distrust so common and widespread concerning what may be excellent preparations allayed.

November 9, 1933.

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APPENDIX II

REPORT BY THE STANDING COMMITTEE OF THE COUNCIL OF AGRICULTURE FOR ENGLAND ON THE BEEF POSITION

1. The present position as regards fat cattle and other stock prices is indicated in the Table attached. It is clear that the expected increase of fat cattle prices following on restriction of imports has not accrued, though there have been increases in respect of other meats. This fact has hit the large section of the industry which produces only, or mainly, fat cattle, very severely. The hot summer has been against a normal consumption of beef, and the graziers have, where possible, been holding back supplies in the hope of a better market. The position now is that with the onset of winter conditions, and with fat stock ready for market, the grazier has either to sell at the existing unprofitable prices—which have been with him for the last twelve months—or hold on, with a bill for feeding stuffs mounting up week by week, until he can sell better at the improved prices which he hopes are on the way. His position in either case is desperate, and the Standing Committee feels compelled to urge that the Government should immediately take any step that may be possible on his behalf.

2. Unfortunately, the Standing Committee does not find itself able to suggest any practicable measure which the Council can place before the Government to improve the situation for the immediate future, though it acutely realizes that it is the present very difficult and economically exhausting period during which it is so important that help should be given.

3. The Standing Committee has considered the possible effect of tariffs on foreign meat imports, and does not see how these by themselves would be certainly effective—even if they were practicable in the face of existing agreements—in improving the home price, because of the very large importations of live cattle from Canada and of frozen meat from certain other of our Dominions, which would still have to come in free of duty. The heavy importations of fat carcass and dead meat from the Irish Free State are already subject to special tariffs, and would need to be considered again if some action in the direction of further tariffs and/or quotas were decided upon by the Government.

4. Another possible means of assisting a rise in beef prices to the farmer is a system which has been suggested of dealing with British beef in a way similar to that adopted for British wheat, which is dealt with by a fixed price to home producers under the Wheat Act. This would involve a levy on imported beef sold in this country, which, roughly, would have to be about the same amount per carcass as the deficiency payment to home producers. Such a levy would tend to fall entirely on the shoulders of the foreign or colonial producer. It is anticipated that a scheme of this kind would, if practicable in the face of or by amendment of the existing trade agreement with Argentina and the Ottawa agreements with the Dominions, at once adjust the balance and restore confidence to the home producer.

5. The Committee is aware that the whole position of the reorganization of the fat stock industry is now being considered by a Commission under the Chairmanship of Lord Bingley, which is expected to report about the end of the year. It is hoped that this Commission's report will, as in the case of previous Reorganization Commissions' reports on other agricultural commodities, make far-reaching suggestions for the future which will commend themselves to the industry for adoption.

6. The Committee, in conclusion, desire to stress once more the fact that if the industry is to be supported it is the present very

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difficult period when instant help must be given, and to ask the Council to request the Government to give again special consideration to the position of home beef producers so that the situation may be explored and re-explored to see whether any means can be found to improve it in this very difficult interim period.

November 9, 1933.

AVERAGE WHOLESALE PRICES OF LIVE STOCK AND MEAT AT CERTAIN
COMPARABLE DATES IN NOVEMBER, 1931, 1932 AND 1933.
(Note.—Prices are in respect of 1st Quality only.)

Description.	Average Prices for week ended		
	Nov. 4, 1931.	Nov. 2, 1932.	Nov. 1, 1933.
<i>Live Stock</i> (Market Price)	s. d.	s. d.	s. d.
Fat Cattle, per live cwt. ..	43 8	37 3	37 9
„ Cows, „ „ ..	32 0	25 3	25 10
„ Sheep, per lb. „ (estimated)	0 10	0 7½	0 9½
„ Lambs „ „ (dressed)	0 10½	0 8½	0 10½
Bacon Pigs, „ „ (dressed)	0 6½	0 5½	0 6½
Pork „ „ „ (weight)	0 7½	0 6½	0 8½
<i>Dead Meat</i> (Wholesale), per lb.			
Beef, English longsides ..	0 7½	0 6½	0 6½
Argentine chilled hinds ..	0 6½	0 5½	0 6½
„ „ „ fores ..	0 3½	0 3½	0 3½
Australian frozen hinds ..	0 4½	0 3½	0 3½
„ „ „ fores ..	0 3½	0 2½	0 2½
New Zealand frozen hinds	0 4½	0 3	0 3½
„ „ „ fores	0 3	0 2	0 2½
Mutton, „ English „ ..	0 9	0 6½	0 8½
Argentine frozen ..	0 4½	0 3½	0 4½
Australian „ ..	0 3½	0 3	0 4½
New Zealand „ ..	0 4½	0 3½	0 5½
Lamb, „ English „ ..	0 9½	0 6½	0 8½
Argentine frozen ..	0 7	0 4½	0 7½
Australian „ ..	0 6½	0 5	0 7½
New Zealand „ ..	0 7½	0 5½	0 7½
Pork, „ English „ ..	0 8½	0 7	0 9½
New Zealand frozen ..	0 7½	0 5½	0 6½
Bacon, „ English *Green Sides	0 8½	0 7½	0 9
„ Danish „ „	0 6½	0 5½	0 8½
„ Dutch „ „	0 6	0 5½	0 7½

* Bristol only.

APPENDIX III

SECOND REPORT FROM THE STANDING COMMITTEE OF THE COUNCIL OF AGRICULTURE FOR ENGLAND ON IMPROVEMENTS TO THE HORTICULTURAL INDUSTRY IN CONNEXION WITH EXISTING IMPORT DUTIES

1. In May, 1932, the Standing Committee made a report to the Council on the subject of the extension of Horticulture following on the new import duties. Duties of one kind and another had been in operation since the beginning of the year 1932, and a list of those existing at the time of the first Report was attached to it. The list as it stands at present is attached to this Report as an Appendix.

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2. The Import Duties Advisory Committee, in their Report dated July 26, 1932 (Cmd. 4145), stated (para. 12) that in addition to increased production, great importance must be attached to improvement in marketing methods, including the organized assembly, grading and packing of the product, and that the progress made in this direction must be kept under observation in connexion with any future review of the duties. In the next paragraph of the Report the Committee stated: "We propose to watch the position . . . and we shall not hesitate to recommend the immediate removal of any of the additional duties here proposed, should it appear to us that, owing to the lack of effective organization, or otherwise, the prospect of the particular commodity produced in this country of the right quality in substantial quantities and at a reasonable price falls short of what may properly be expected."

3. In view of this position the Standing Committee decided to keep the situation under review and to inform the Council from time to time how it stood.

Orchards

4. Taking first the outdoor fruits: the area returned as under orchards in 1933 was 249,400 acres as against 247,300 in 1932; this last figure was itself a slight increase on the previous year. The increase this year in the acreage of orchards was therefore 2,100 acres. This was a net increase, since increases occurred in Kent (1,300 acres), in Gloucester (700 acres), in Worcester (530 acres), and Essex (660 acres), which totalled about 3,200 acres, and these were themselves net increases in their counties. Together with new areas also in other parts of the country, it is estimated that the new acreages of orchards last year would probably not have been less than about 5,000, which would, to make the net increase of 2,100 acres, have left some 3,000 acres to be abandoned as orchards and used for other crops. If this figure (3,000) is deemed too large to represent the withdrawals from orchards, then it is still submitted that the figure of 5,000 should not be too great since there are known to be orchard areas which have been entirely replanted in the year, and these would not be shown any differently in the returns. It is of course extremely difficult to make a close estimate in the absence of a detailed survey, county by county, but the figures supplied by the Ministry of Agriculture and given above do, in the Committee's view, suggest that about 5,000 acres can be taken as a rough indication of the minimum area of newly planted or replanted orchards for last year. The point that the Committee wish to make in connexion with it is that, estimating the new capital expended on orchards at the moderate figure of £50 an acre, it represents a sum of about a quarter of a million pounds sterling spent on the item in the year 1932.

Apples

5. As regards apples: figures for 1933 are not yet available as regards the produce of the home crop. The crop for 1932 was only a moderate one and yet the production was reckoned to be 2,515,000 cwt. as against 1,574,000 cwt. in 1931. The imports of apples also increased from 6,172,000 cwt. in 1930, 7,600,000 cwt. in 1931, to 8,118,000 cwt. in 1932. During the first nine months of this year about 4½ million cwt. were imported, but there is usually a very large importation in the last three months of the calendar year. The home consumption of this fruit is undoubtedly going ahead, and that fact is, incidentally, assisting the home producer. We would like to see the public give more and more preference to the home-grown fruit, which is year by year of better quality. The public is helped in this direction by the differentiation between home grown and imported now made in some retail shops, which is assisted by the National Mark scheme of the Ministry of Agriculture.

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Pears, Plums, etc.

6. The effect of the increased orchard acreage on the production of other fruits, e.g., pears, plums, cherries, etc., will be better reviewed when the Ministry of Agriculture's detailed acreage and produce figures for 1933 are available. In the meantime, it can be said that, of the principal crops—pears and plums—the quantities imported this year remain about normal in the case of pears and definitely less in that of plums. The actual import figures were: pears, in 1930, just over 1 million cwt.; 1931, 1,200,000 cwt.; 1932, 1,100,000 cwt.; and the first nine months of 1933, 760,000 cwt.; plums, in 1930, 390,000 cwt.; 1931, 513,000 cwt.; 1932, 345,000 cwt.; and the first nine months of 1933, 252,000 cwt. It should be remembered in connexion with importation of all fruits and vegetables that the import duties have had the effect of restraining the lower quality imports, which, again, means that the home product has a sharper competition than before with imported products as regards quality, especially where total quantities imported are maintained in spite of the duties.

Small Fruit

7. Although the statistics do not, so far as they are at present available, reflect the real increase in the production of small fruit (strawberries, raspberries, currants and gooseberries), they leave no room for doubt that there has been an advance. The acreage returns show a reduction between 1930 and 1932 from 66,000 to 59,500 acres. The decline was stated to be almost entirely due to the unremunerative prices for currants and gooseberries of the 1930 and 1931 crops. The duties, however, accompanied by better prices, have stemmed the tide, and the acreage of small fruit is this year up by 300 acres to 59,800. We do not yet know how this total acreage is divided; that is, we cannot yet say which small fruit crop has gone ahead most. Some idea of the proportion of each of the crops within the total is to be obtained from the Agricultural Statistics of 1932, which show that the area of strawberries, on holdings of one acre and upwards was, in 1932, 23,500 acres, excluding the area scheduled as under mixed fruit. The area of raspberries was 5,900 acres, black currants 10,300 acres, red and white currants, 3,300 acres, and gooseberries 14,100 acres.

8. Turning to figures of importations of these fruits, strawberries in 1932 were only 41,000 cwt. as against 90,000 cwt. in 1931. The importation this year was 12,000 cwt. No separate figures are given for the importation of raspberries, but currants, which are taken all kinds together, show also a marked decline in the last few years, from 123,000 cwt. in 1930, to 103,000 cwt. in 1931, to 47,700 cwt. in 1932. The importation for 1933 was 33,000 cwt. Gooseberries have suffered a like decline: from 29,000 cwt. in 1930 to 17,000 cwt. in 1931 and 11,000 cwt. in 1932. The importation this year was practically the same as for 1932.

Canned Fruit

9. As regards canned fruits, large quantities are still imported although the output of the new home canning industry has increased. It will take time for the housewives of this country to realize that the canned fruits produced in this country are amongst the best in the world and that they should take a prior position in the family menu to the imported, semi-tropical fruits from abroad. Imports reached a record in 1932, however; the figure for imports of canned and bottled fruit (the large majority of it canned) being 1,732,000 cwt. in 1930, 2,177,000 cwt. in 1931, and 2,247,000 cwt. in 1932. This very considerable importation has meant that our canners in the early years of their big effort have found difficulty in selling all the home pack at a profit. The fact, too, that the excellence of our home-canned fruits remains unrecognized in households has also proved a set-back to the industry. Both factors together have operated adversely on growers, who have largely on their account been unable always to get

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from canners the full and favourable contracts for fruit which they were expecting in order to give them confidence and the assurance necessary to push their production as far as it should reasonably go.

10. We must not, however, allow these temporary difficulties to obscure the fact that the canning industry in this country has made extraordinary strides in the last few years, and that not only in the case of fruits but for the more delicate vegetables they offer a market for increased production which should be of very considerable value to the home producer. In 1927, there were 23 canning factories for fruit and vegetables in operation in England and Wales; in 1931, there were 59, and this year there are 74. The National Mark scheme for canned fruit and vegetables has undoubtedly assisted them in their forward progress as much as it has assisted the horticultural industry in those sections of it which have specially catered for the canners. Forty-one firms authorized to pack under the National Mark control 51 of the canneries, all of which are engaged in the production of National Mark canned fruits and vegetables. In addition to the erection of new factories there have been extensions of existing factories, so that the industry has advanced even more than the figures of actual factories suggest. To meet the demand for a greater uniformity in English packs of canned fruits, definite standards have been agreed as regards size of fruit, syrup strengths, and weight of fruit in cans, and samples are now examined and judged on the new basis. No doubt this basis will, when the details have been tested by experience, recommend itself for adoption in the case of all English packs. Assistance in increasing the demand for the growing of larger quantities of the right kind of home-grown fruits is given by the bottling industry as distinct from canning, and from the ever-increasing jam-making industry. Both bottling and jam-making have now the advantage of National Mark grades and packs wherever manufacturers wish to adopt them.

Altogether, the evidence of progress in this section is satisfactory, though the competitive importation is severe and tends to hold back unduly that progress which might not unreasonably be expected. We would suggest that consideration should be given to the point of whether the duty now operating on canned goods should be changed from one imposed *ad valorem* to a specific duty.

Flowers

11. There is little definite statistical information to be obtained as to increase of home production, though it is a known fact that in Devon, Cornwall and Lincolnshire large additional areas have been planted with popular crops. The figures of imports show that the values of fresh flowers imported during this year have been well maintained. They were £765,000 in 1930, £1,064,000 in 1931, £611,000 in 1932, and in the first nine months of 1933, £571,000. The importations of plants and bulbs appear to be in a similar position as regards quantities, though they have definitely receded as to values. The numbers of plants, shrubs and trees imported in 1930 were 49 million, 1931, 40 million, and 1932, 37 million, though the values of these were respectively £421,000, £339,000 and £193,000; the value of the importations during the first nine months of this year having dropped to £64,000 for a larger quantity than was imported in the corresponding period of 1932. The importation of bulbs in 1930 was 464 million, 1931, 581 million; and 1932, 750 million. The 1933 importation will probably not be much less than that for last year.

12. The comments we have to make on this section are, first, that rose trees were selected for a special duty on them, by number, both in 1932 and 1933 (now £5 and 25s. per roo), and the imports of them were accordingly much restricted. Total supplies of rose trees in the country, nevertheless, have been ample, and the prices of British rose trees have remained unchanged, whilst the area under them has, we are informed, been a good deal increased. As regards

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general nursery stock, the growers appear to have welcomed the duties on trees and shrubs, though, with less planting going on on estates and in country gardens, there is a much diminished demand for nursery products. Nurserymen's premises are therefore likely to be overstocked at the present time.

Vegetables

13. Increases in acreage of nearly all the vegetable crops were reported this year. The chief of them were potatoes, 2.8 per cent. increase; cauliflower and broccoli with an increase of 16.9 per cent., carrots, of 12.8 per cent.; onions, of 5.3 per cent.; brussels sprouts, of 8.8 per cent.; and green peas of 5 per cent. Decreases were reported only in cabbages for human consumption (2.4 per cent.) and celery (5.2 per cent.). The area of rhubarb was unchanged.

14. Apart from these definite figures, there are known to have been increased plantings in certain market garden crops not shown in the returns, e.g., asparagus and French beans, both more in demand for canning, and in lettuce and other salad crops.

15. As regards imports of vegetables, these, in the case of potatoes, have varied considerably in the last few years: in 1930 they were less than 6 million cwt.; in 1931, 16½ million cwt.; and in 1932, 15½ million cwt., whilst in the first nine months of this year they totalled no more than 3½ million cwt. Onions have kept fairly stable at about 10 million bushels, the figures so far this year being at about the same rate. Tomatoes were over 3 million cwt. in 1930, nearly 3 million cwt. in 1931, and less than 2½ million cwt. in 1932; the importation so far during this year is more in the proportion of the higher importation of 1931 than that of last year. Imports of raw vegetables, other than these three kinds, were valued at £1,713,000 in 1930, £1,691,000 in 1931, and barely more than a million in 1932; and the imports during the first nine months of this year are at an even lower rate; the figures include asparagus, cauliflowers, salads, French beans, green peas, cabbage, brussels sprouts, carrots, turnips, cucumbers and gherkins.

16. These figures appear to show that the duties imposed on vegetables, other than onions and tomatoes, have had an appreciable effect in reducing the amount of foreign produce on our markets, and thus preparing the way for increased home production. The present position will, however, not be made clear until we have the figures of production from home acreages. We would here suggest that it would serve a very useful purpose if the Ministry were able to obtain even more detailed statistics than are at present available of the produce of these crops, and publish them in all cases as soon as possible annually. A quinquennial census for the more insistent calls for information and action by way of restriction of imports today is of no real value, and we would urge that the Ministry be empowered to collect any necessary returns of this kind biennially where it knows they would be useful.

17. Apart from statistics, our own view—the result of such observation as we have been able to make in various parts of the country—is that growers have readily responded to the opportunities given them by the new duties, and have taken steps to increase their production wherever they see a better market promising. But we shall not see evidence of the real extent of this response until we have the complete figures showing the produce of all market gardens and other such holdings throughout the year. In some cases, land in such holdings is put under two or three, or—in a few special cases of so-called “French” gardening, with frames and cloches—several more crops during the year.

Canned Vegetables

18. Various kinds of home-grown vegetables are now canned in this country, and the results, so far as quality is concerned, have proved a surprising success. The green peas, the French beans, the asparagus and carrots are building up a reputation for themselves

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which is assisting the new home product when it comes into competition with imported products. It would be an advantage if fuller statistics of output were available so that the real extent of the assistance given by the canners and bottlers to the various vegetable crops can better be gauged. It is no doubt only a question of time for a complete service of statistics to be organized. In this connexion, we would call the attention both of growers and canners to the value, if they wish to make absolutely sure of their own wholesale markets, of standardizing their products before delivering them. This operation, especially where it is done on understood and well-accepted lines, as under the National Mark schemes, commands the respect of buyers, and the prices paid to both growers and canners are raised, or should be raised, accordingly. We cannot over-emphasize the value of this factor as a recommendation to growers of all kinds of products to adopt in their endeavour to secure for themselves the whole of the very large and very good home market.

19. As an example of the kind of improvement that follows from organized interests in industry, there is the following instance in celery culture. A well-known firm buys celery of good quality in bulk from the growers, part of which is washed, graded, packed and put on the market for consumption as fresh celery, the remainder being used for canning. Such a combination of functions ensures that a good supply of high quality celery is available for the fresh market, and, when the product is no longer available fresh, ensures that preserved supplies are available for the rest of the year.

The Glasshouse Industry

20. There seems little doubt but that large acreages of new glass-houses have been erected within the last few years all over the country for the growing of early vegetables, fruits and flowers. The horticultural building trade appears to have had more work this year than for many years past. An instance of rapid increase comes from Norfolk, in the neighbourhood of Terrington St. Clement, where it appears that last year (1932) there were 164 glasshouses, averaging 120 ft. by 30 ft.; this summer (1933) there were about 205 such glass-houses. Another is from Lancashire and Cheshire, where it is stated that many small men who had one or two houses of about 100 ft. by 20 ft. have doubled their areas, and the larger holders have also increased theirs, some about half as much. The advance is to be attributed not merely to the market opportunities provided by the new duties; it is also due to improvement of horticultural methods made necessary by the more strenuous modern business conditions and also in the ordinary way of sound business development. If no more than 100 acres in all the country have been covered with glass within the last year then the cost, roughly speaking, at an average of £3,000 per acre, will give an increased capital to the industry of about 300,000 pounds sterling.

21. In addition to the erection of glasshouses there have been considerable developments in small glass-frame culture. We are informed that so many of these low "Dutch" frames have been put down in 1932/33 that in many parts of the country it must be like the establishment of an entirely new industry. A large grower in Lincolnshire informs us that, instead of allowing his low Dutch frames to stand idle, or comparatively so, for the few summer months after the early lettuce is taken in May, he has this year grown cantaloupe melons in the frames, and has marketed them successfully at Covent Garden in competition with the imported melons, on which there is a duty of only 10 per cent. The English cantaloupes thus grown are stated by the buyers at Covent Garden to be even superior in weight, flavour and sugar content to the average good class fruit imported from abroad. The Committee has pleasure in mentioning these advances and hopes the publicity which will be given to them will cause other growers who have not yet decided upon it to make similar

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changes in their cropping methods. There is undoubtedly plenty of room for advance whilst horticultural importations all remain at the high figure they stand at today. The importation of melons, for example, was estimated by the Empire Marketing Board to have been between 150,000 cwt. and 200,000 cwt. during 1932, and there is ample scope for increased supplies of this delicious fruit on the home market if they can be placed there to sell at attractive prices.

General

22. As regards the general situation of increase of production with the help of the import duties, we consider that there is at the present time no fear that home production will extend so rapidly that the home market will be over-filled by it. That may come in the case of some commodities before very long. What can be said, however, is that, speaking generally, the qualities, presentation and marketing in the case of both fruits and vegetables placed on the home market have improved in recent years, and the operation of the various National Mark schemes has been a considerable factor in this improvement. The more we examine the whole position the more we are convinced that the key-note of success for the home grower today, after making sure that he is growing the varieties of products best suited for his market, is the standardization and grading of his output. The re-organization of the industry on the lines suggested in the Agricultural Marketing Acts will probably follow in due course and then the growers will be in a position to control their market. A marketing board for vegetables, for example, when dealing with cauliflowers and broccoli, would see that excessive quantities of these vegetables did not glut the wholesale markets because they were all sent in at about the same time.

November, 1933.

SCHEDULE TO REPORT

Duties at present chargeable on Imported Horticultural Commodities

Commodity.	Rate of duty chargeable on imports from	
	Foreign Countries. (1)	Irish Free State. (2)
Fruit:—		
Fresh:—		
Apples	.. 4s. 6d. per cwt. (10 per cent. <i>ad valorem</i> when consigned direct to a registered cider factory)	10 per cent. <i>ad valorem</i>
Bananas	.. 2s. 6d. per cwt.	10 per cent. <i>ad valorem</i>
Bilberries	.. Free	Free
Cherries	.. May 1 to Aug. 15, 3d. per lb.; Aug. 16 to Apr. 30, 10 per cent. <i>ad valorem</i>	Same as (1)
Currants	.. May 1 to Aug. 31, 2d. per lb.; Sept. 1 to Apr. 30, 10 per cent. <i>ad valorem</i>	Same as (1)
Gooseberries	.. May 1 to July 31, ½d. per lb.; Aug. 1 to Apr. 30, 10 per cent. <i>ad valorem</i>	Same as (1)
Grapefruit	.. 5s. per cwt.	10 per cent. <i>ad valorem</i>

Grapes, hothouse	3d. per lb.	Same as (1)
Grapes, other than hothouse	Feb. 1 to June 30, 1½d. per lb.; July 1 to Jan. 31, 10 per cent. <i>ad valorem</i>	10 per cent. <i>ad valorem</i>
Oranges	.. Apr. 1 to Nov. 30, 3s. 6d. per cwt.; Dec. 1 to Mar. 31, 10 per cent. <i>ad valorem</i>	10 per cent. <i>ad valorem</i>
Peaches and Nectarines (hothouse)	Apr. 1 to Oct. 31, 1s. per lb.; Nov. 1—30, 10 per cent. <i>ad valorem</i> ; Dec. 1 to Mar. 31, 14s. per cwt.	Apr. 1 to Oct. 31, 1s. per lb.; Nov. 1 to Mar. 31, 10 per cent. <i>ad valorem</i>
Peaches and Nectarines (others)	Apr. 1 to Nov. 30, 10 per cent. <i>ad valorem</i> ; Dec. 1 to Mar. 31, 14s. per cwt.	10 per cent. <i>ad valorem</i>
Pears	.. 4s. 6d. per cwt.	10 per cent. <i>ad valorem</i>
Plums	.. June 1 to Oct. 31 and Dec. 1 to Mar. 31, 9s. 4d. per cwt.; Nov. 1—30 and Apr. 1 to May 31, 10 per cent. <i>ad valorem</i>	June 1 to Oct. 31, 9s. 4d. per cwt.; Nov. 1 to May 31, 10 per cent. <i>ad valorem</i>
Raspberries and Loganberries	and July 1 to Aug. 31, 2d. per lb.; Sept. 1 to June 30, 10 per cent. <i>ad valorem</i>	Same as (1)
Strawberries	.. Apr. 1 to July 31, 3d. per lb.; Aug. 1 to Mar. 31, 10 per cent. <i>ad valorem</i>	Same as (1)
Preserved in sugar or syrup, Cherries, drained, glacé, etc.	25 per cent. <i>ad valorem</i> , plus the duty payable on the sugar content	Same as (1)
Candied or drained peels	20 per cent. <i>ad valorem</i> , plus the duty payable on the sugar content	Same as (1)
Apples, preserved in syrup	3s. 6d. per cwt., plus the duty payable on the sugar content	10 per cent. <i>ad valorem</i> or the preferential duty payable on the sugar content, whichever is the greater
Other Fruits, preserved in syrup	15 per cent. <i>ad valorem</i> , plus the duty payable on the sugar content, etc.	10 per cent. <i>ad valorem</i> or the preferential duty payable on the sugar content, etc., whichever is the greater
Fruit preserved by chemical or artificial heat (other than fruit preserved in sugar) and dates:—	10s. 6d. per cwt.	Same as (1)
(a) Dried Apples, Pears, Peaches and Nectarines		

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(b) All other kinds	25 per cent. <i>ad valorem</i>	Same as (1)
Fruit pectin	.. 25 per cent. <i>ad valorem</i>	Same as (1)
Flowers, Plants,		
Trees, etc.:—		
Cut Flowers—Lilac,	2d. per lb.	Same as (1)
Gypsophila,		
Heather, Peonies,		
Marguerites,		
Marigolds, Mim-		
osa, Narcissi		
(Polyanthus		
types), Star of		
Bethlehem, Stocks		
and Violets		
Other cut Flowers	9d. per lb.	
Flowers attached to		
bulbs	9d. „ „	
Foliage (excluding		
Holly, Mistletoe,		
Asparagus foliage		
and Golden Palm		
branches)	2d. „ „	
Asparagus foliage	9d. „ „	
Plants, Trees and		
Shrubs in flower		
(excluding Rose		
trees and Fruit		
trees)	9d. „ „	
Other plants, other		
than plants in		
flower, and roots		
of flowering plants		
(except Lily of		
the Valley crowns		
and roots)	6d. „ „	
Rose Trees:—		
(a) all standard		
trees (including		
half standards,		
quarter standards		
and weeping		
standards)	£5 per 100	
(b) all others ..	25s. „ „	
Fruit Trees and		
Fruit stocks	20s. per cwt.	
Trees and shrubs		
(other than in		
flower) (excluding		
Rose trees, Fruit		
trees, Azalea		
indica, and Sweet		
Bays):—		
Bare roots ..	20s. „ „	
Balled roots ..	10s. „ „	
Vegetables:—		
Fresh:—		
Asparagus ..	Jan. 1 to June 30, 4d. per lb; July 1	
	to Dec. 31, 10 per cent. <i>ad valorem</i>	
Green Beans ..	Jan. 1 to Aug. 31, 1½d. per lb.; Sept. 1	
	to Dec. 31, 10 per cent. <i>ad valorem</i>	
Broccoli and		
Cauliflowers ..	3s. per cwt.	

Carrots ..	2s. 4d. per cwt.
Cucumbers (other than Gherkins)	Mar. 1 to Nov. 30, 8s. per cwt.; Dec. 1 to end of Feb., 10 per cent. <i>ad valorem</i>
Lettuce, Endive and Chicory (salad)	Jan. 1 to Apr. 30, 8s. per cwt.; May 1 to Dec. 31, 6s. per cwt. 8d. per lb.
Mushrooms ..	
Green Peas, shelled ..	Jan. 1 to July 31, £1 17s. 4d. per cwt.; Aug. 1 to Dec. 31, 10 per cent. <i>ad valorem</i>
Green Peas, unshelled ..	Jan. 1 to July 31, 9s. 4d. per cwt.; Aug. 1 to Dec. 31, 10 per cent. <i>ad valorem</i>
Potatoes, new ..	July 1 to Aug. 31, £2 per ton; Sept. 1 to Oct. 31, £1 per ton; Nov. 1 to June 30, 4s. 8d. per cwt.
„ others ..	July 1 to Aug. 31, £2 per ton; Sept. 1 to June 30, £1 per ton
Tomatoes ..	June 1 to July 31, 2d. per lb.; Aug. 1 to Oct. 31, 1d. per lb; Nov. 1 to May 31, 10 per cent. <i>ad valorem</i>
Turnips ..	2s. 4d. per cwt.
Vegetables preserved in air-tight containers (excluding Tomatoes) and excluding pickled and vegetables preserved in vinegar	20 per cent. <i>ad valorem</i>

Note.—All horticultural commodities not shown in the above list, imported from foreign countries or from the Irish Free State, are chargeable with the general 10 per cent. *ad valorem* duty, while those from other British countries are admitted free of duty, except in the case of preserved fruits, when the preferential duty on sugar content is payable.

MARKETING NOTES

The Livestock Situation.—The following statement was made by the Minister of Agriculture and Fisheries in the House of Commons on Wednesday, December 20, 1933:—

The Government have had under consideration the position of the beef industry in this country. Notwithstanding the efforts that have been made since November, 1932, to hold and improve the situation on the wholesale meat market, the returns from the feeding of cattle have continued unsatisfactory. Many United Kingdom feeders have kept back their stock from sale owing to the low level of prices, while supplies from other sources have been pressed on the market. The number of home-produced fat cattle marketed this summer and autumn has thus been less than in the corresponding period last year. The supplies held back are likely, however, to come forward at an early date, so that the immediate problem is now that of averting a further price decline as well as of bringing about an improvement in the situation.

In these circumstances, it is essential to afford some relief to the market in respect of the supplies of cattle imported for immediate slaughter.

At present such cattle are imported into the United Kingdom from two sources only, namely, the Irish Free State and Canada.

As regards the Irish Free State, an Order will be issued forthwith under the Agricultural Marketing Act, 1933, under which it is intended to limit the imports of fat cattle from the Irish Free State from now to March 31 next to 50 per cent. of the numbers imported in the corresponding period of 1932-33. As a complementary measure, it is also intended, under the Order to limit the number of stores that may be imported from the Irish Free State. In terms of total cattle imports from that source, the reduction will be in the neighbourhood of $12\frac{1}{2}$ per cent.* The Order, also as a complementary measure, will prohibit the importation of beef and veal and beef and veal offals from the Irish Free State.

As regards the Dominion of Canada, His Majesty's Government in that Dominion have been asked to co-

* Statement A.

MARKETING NOTES

operate by stabilizing exports of cattle, both fat and store, to this market for the first quarter of 1934 at the corresponding figures of the first quarter of 1933.* I am glad to say that they have agreed to do so, and we thank them most heartily for their readiness to meet us.

Imports of foreign canned beef are dutiable, but, as in the case of imports of fat cattle, they have hitherto been unregulated. They will now be brought under control, and arrangements are being made to limit the supplies coming forward next quarter.†

As regards chilled beef, arrangements have been made to reduce imports from foreign countries by the same extent as in the first quarter of 1933.

As arranged at Ottawa, imports of frozen beef from foreign countries will be reduced next quarter by 30 per cent. below the quantity imported in the first quarter of 1932. Finally, negotiations are proceeding with a view to readjusting the proportions of boned and boneless beef imported from foreign countries under this designation.

The Government have also had under consideration the situation in the bacon market, taking into account the large expansion in home bacon production attained within the last few months, and have decided that, if the step is justified by the number of pig-contracts entered into by home producers for the period beginning March 1 and ending on December 31 next, due allowance being made for Northern Ireland production, they will be prepared to reduce imports from foreign countries by a further 7 per cent. on March 1 and by an additional 3 per cent. on June 1, making a total reduction on the present rate of importation of 10 per cent. on and from June 1, 1934.

STATEMENT A.

Imports into the United Kingdom from the Irish Free State.

					January to March inclusive, 1933.
†Live Cattle—					
Fat cattle	..	..	..	..	46,148
Store cattle	..	..	..	..	75,267
Milch cows	..	..	..	..	3,235
Springers	..	..	..	..	342
Calves	..	..	..	..	17,020
Total					142,012
Fresh Beef—					1933. Cwt.
January to March (inclusive)	..	..	..	..	895
November only	..	..	..	..	12,586

* Statement B.

† Statement C.

‡ Irish Free State official figures.

MARKETING NOTES

STATEMENT B.

Imports of Cattle into the United Kingdom from Canada classified according to Licences issued at Ports of Arrival.

			January to March inclusive.		January to November inclusive.	
			1932.	1933.	1932.	1933.
Store	..	..	Nil	2,407	3,120	15,380
Fat	..	..	409	4,457	13,604	31,075
Total ..			409	6,864	16,724	46,455

STATEMENT C.

Estimated Imports of Canned Beef from Foreign Sources.

		1931. Cwt.	1932. Cwt.	1933. Cwt.
January to March, inclusive	..	204,000	105,000	150,000
January to November, inclusive	..	899,000	721,000	805,000

The "Bacon Indemnity Loan."—The Agricultural Marketing (No. 2) Bill, 1933, passed through all its stages in both Houses of Parliament in December and received the Royal Assent before the Adjournment. The circumstances that gave rise to this Act and the main features of the measure were briefly described in the last issue of this JOURNAL. The Committee to supervise the making of payments out of the fund, the creation of which will be made possible by the Act, has now been appointed. The three members nominated by the Minister and the Secretary of State for Scotland are:—Lt.-Col. Sir Wyndham Portal, Bart., M.V.O., D.S.O. (Chairman), Mr. H. G. Howitt, D.S.O., M.C., F.C.A., and Mr. W. H. Coates, LL.B., B.Sc., Ph.D. The Pigs and Bacon Marketing Boards have also each appointed three members.

Progress of the Pigs and Bacon Marketing Schemes.
—*Deliveries under Contract.*—While complete statistics as to deliveries of pigs under contract during November are not yet available, it can be said that in general there has been no failure on the part of producers to deliver the number of pigs contracted for. Curers, on the other hand, have found considerable difficulty in taking delivery of all contract pigs. This has been particularly so in the case of pigs sold on group contracts, where the Pigs Board is the purchaser in the first instance and has in its turn to dispose of the pigs to curers. Difficulty has arisen from the fact that pigs which had been held up by producers in October ready for November contracts came

MARKETING NOTES

forward in large numbers early in the month, and, also, from the weakness of the bacon market in November, which made it difficult for curers to clear their stocks of bacon. In the case of group contract pigs, many of which are in the hands of producers in outlying areas such as Cornwall and Wales, high transport charges have also deterred curers from buying. The appointment of the Committees to assess curers' losses, under the indemnity scheme (see above), and the improvement in bacon prices which should take place when the full effect of the reduction in imports is felt, should largely ease the situation as far as contract deliveries are concerned.

Grading Results.—The following Table summarizes the grading results for pigs delivered direct under contracts in November:—

Grade		Total	Class I	Class II	Class III	Class IV
A	..	18.0	11.8	3.2	2.0	1.0
"	B	14.0	9.1	2.5	1.6	0.8
"	C	23.0	15.2	4.0	2.6	1.2
"	D	21.0	13.7	3.7	2.4	1.2
"	E	19.0	12.5	3.3	2.2	1.0
		<hr/> 95.0	<hr/> 62.3	<hr/> 16.7	<hr/> 10.8	<hr/> 5.2

The balance of 5 per cent. of the pigs delivered was rejected by curers as being in the wrong weight class or of unsuitable quality.

On the basis of the above grading analysis, the average price received by producers for pigs accepted under contracts would appear to have been 11s. 9½d. per score, including deductions in respect of black or mainly black pigs.

Transport Rates.—The Pigs Board has succeeded in obtaining from the Railway Companies special rates for the transport of pigs from the south-western counties to the Midlands. The possibility of securing a flat rate for the transport of pigs by rail throughout the country is being explored.

Feeding Stuffs Prices.—The average price of the feeding stuffs ration, on which the contract prices for pigs are based, for the 16 weeks ended December 13, was 7s. 5d. per cwt. This means that the price of the "Basic pig" remains during January, 1934, at 12s. per score.

MARKETING NOTES

Prices for Next Contract Period.—Preliminary discussions with regard to contract terms for the period commencing March 1 next have taken place at meetings of the Pigs and Bacon Boards.

Development of Tank Curing.—Steps are being taken by curers to increase the output of tank-cured bacon. Seven firms alone have made plans that will enable them to cure between them up to 13,000 pigs a week by this method.

Distribution of British Bacon.—Discussions between the Bacon Board and the Federation of Grocers' Associations have resulted in a decision to appoint a joint committee of the two organizations to discuss questions affecting the distribution of home-produced bacon.

Amendment of the Hops Marketing Scheme, 1932.—After considering the report on the public inquiry into objections, the Minister made certain modifications to the amendments, with the consent of the Hops Marketing Board. The modified amendments were submitted to Parliament early in December.

The principal amendments provide for a quota of hops to be allocated to each registered producer every season. The quota is to be calculated by reference to his "basic quota" and to the estimated total market demand for hops of that season, as determined under any Act or estimated by the Board. Generally speaking, the "basic quota" allotted to every registered producer, in respect of every farm which was in his occupation and was wholly or partly under hops in 1932, will be the average annual quantity of hops picked on that farm during the years 1928 to 1932 inclusive. Special provisions are, however, inserted for enabling the Board to deal equitably with the owner-occupier who "grubbed" hops on his land before 1932; for re-allotting basic quotas that have lapsed, e.g., on the death of a producer; for the retention, by a tenant-occupier, of a due proportion of his basic quota in circumstances where it would otherwise lapse; and for the allocation by the Board of further basic quotas when the total seasonal quotas exceed total basic quotas by more than ten per cent.

Any hops that are in excess of a producer's quota for a given season and are sent by him to the Board for sale in that season, are to be treated as non-quota hops. For these

MARKETING NOTES

he will receive payment only if there is any surplus after full payment has been made by the Board for all quota hops.

Progress of the Milk Marketing Scheme.—For the first month of the Scheme (October) sales of milk by producers and producer-retailers together exceeded 50,000,000 gallons. Payments amounting to over £2,150,000 were made to 67,000 wholesale producers. Payments for November sales were made on Dec. 18, in respect of all accounts duly certified by both producer and buyer and received by the Board up to Dec. 9. Accounts delivered to the Board's offices from Dec. 9 to 16 were paid by Dec. 23.

Pool Prices for October and November.—Regional pool prices and producer-retailers' contributions for October and November are shown below:—

Region.	Regional Pool Prices.		Producer-Retailers' Contributions.	
	October.	November.	October.	November.
	d.	d.	d.	d.
Northern	13½	14	1½	1½
North-western	13½	14	1½	1½
Eastern	14	14½	1	1½
East Midland	13½	14½	1½	1½
West do.	12½	13½	1½	2½
North Wales	13½	13½	1½	1½
South do.	13½	13½	1½	1½
Southern	14	14½	1	1½
Mid-western	12½	13½	1½	1½
Far do.	13½	13½	1½	2½
South-eastern	14½	14½	1½	1½

The unweighted average pool price of 13.95d. in November compares with 13.55d. in October; and the unweighted average producer-retailer's contribution was 1.78d. in November, as compared with 1.41d. in October.

The utilization of milk in October and November (as far as figures are available) was as follows:—

		Gall.	Gall. per day.	Percentage.
October.	Manufactured	6,682,541	256,000	16
	Liquid	34,936,783	1,340,000	84
	Total ..	41,619,324	1,596,000	100
November.	Manufactured	8,826,597	294,000	18
	Liquid	39,292,558	1,310,000	82
	Total ..	48,119,155	1,604,000	100

November invoices, it is stated, show a reduction of 3 per cent. on the daily output, as compared with October.

MARKETING NOTES

The inter-regional compensation levy was again fixed at 1d. per gallon, and 85 per cent. of the proceeds were distributed.

Eighteen per cent. of the November milk went to manufacture, as compared with 16 per cent. in October. The average manufacturing price in November was 5.46d., as compared with 5.6d. in October.

Expenses were again charged at the rate of $\frac{1}{4}$ d. per gallon.

Arbitrations.—The Minister has appointed Mr. Hubert Hull, Barrister-at-law, to be the arbitrator in the dispute between the Milk Marketing Board and Mr. William Hollow, of St. Ives, on whom the Board had imposed a penalty of £50 in respect of an alleged contravention of the terms of his licence as a producer-retailer.

The Potato Marketing Scheme.—On December 20, 1933, an Order was issued by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland approving a scheme, under the Agricultural Marketing Act, 1931, for regulating the marketing of potatoes produced in Great Britain. The scheme came into force on December 21, 1933.

The draft scheme was prepared by the National Farmers' Unions of England and Scotland, and was submitted to the Minister and Secretary of State by representatives of those Unions on March 24, 1933. A Public Inquiry into objections made with respect to the scheme was held by Mr. C. T. Le Quesne, K.C., from July 5 to 7 in London, and from July 10 to 13 in Edinburgh. Progress was, however, delayed for a time by an interim Interdict obtained in the Scottish Courts, prohibiting the Secretary of State for Scotland from proceeding further with the scheme. The Interdict was recalled upon an undertaking given by the Lord Advocate that the Secretary of State would not lay, or consent to the laying, of the draft scheme before Parliament without giving the complainants an opportunity of renewing their application to the Courts. That undertaking was fulfilled and the draft scheme, as modified with the assent of the promoters, was laid before Parliament on December 5, 1933. Resolutions approving the scheme were passed by the House of Lords on December 12, and by the House of Commons on December 20.

MARKETING NOTES

The scheme now enters a "suspensory period" during which a poll of registered producers will be taken to decide whether the scheme shall remain in force. Unless two-thirds of the registered producers voting, counting numbers and production capacity, are in favour of the scheme, it will lapse. If the requisite majority is obtained, the scheme will come fully into operation one month after the result of the poll is declared.

Arrangements are now in hand for the registration of producers and the conduct of the initial poll. The last date for registration for the purposes of the poll is January 17, 1934. Producers may, of course, register at any time, but only those registered on or before the above date will be qualified to vote on the initial poll.

The regulated product as defined in the scheme is "potatoes produced or in course of production in Great Britain." All producers who have more than one acre under potatoes must be registered with the Potato Marketing Board if they wish to sell potatoes of any kind. Producers with less than one acre under potatoes are exempt from registration. The Board may exempt from all or any of the provisions of the scheme such classes of producers and such classes of sales as it may specify. Sales of seed potatoes are exempted by the scheme itself from the operations of the marketing provisions.

Surplus Control.—The most important powers enable the Board to deal with the surplus problem. If it considers that the supply of potatoes for human consumption will exceed market requirements it can exclude the surplus, either by raising the minimum riddle size for marketable main crop potatoes (which until further determination is fixed at $1\frac{1}{2}$ in.), or by fixing the quantities that individual producers are permitted to sell. In any case, of course, it will have to estimate carefully the supply of potatoes that the market can absorb at a price sufficient to give growers a reasonable return. The Board may differentiate between the various areas, varieties of potato and classes of producer, if this is necessary to make the arrangements work more equitably.

Further, the Board can undertake or assist in the disposal of surplus potatoes. It may buy, sell, adapt for sale, advertise, store and transport surplus potatoes. In this way it could promote the use of potatoes as a feeding stuff for live stock.

MARKETING NOTES

To ensure that the cost of disposing of additional surplus potatoes caused by excess planting is shared by those responsible the Board may demand an additional non-recurring contribution to its funds from registered producers who plant more than and thus increase their "basic acreages."

The powers granted to the Board for dealing with surplus problems are therefore very wide. It may use them as extensively, or as little, as it finds expedient; and it is not bound in any way to attempt any particular method of surplus control before using another.

Basic Acreage.—The "basic acreage" of any producer is a standard acreage fixed for him on lines prescribed in the scheme. It does not, however, represent a maximum acreage. The object is simply to provide a means of assessing each producer's responsibility for the cost of disposing of any surplus that is attributable to increased planting.

Generally a registered producer's basic potato acreage for any holding in 1934 will be the maximum acreage planted with potatoes on the same holding in 1933, either by himself or by a previous occupier. For most producers, this will provide a generous basic acreage. Alternatively, a producer may choose to have as his basic acreage the average acreage that he had under potatoes in the years 1931, 1932, and 1933; or finally he may choose the greatest potato acreage held by him in any one of these three years, subject to a maximum of seven acres.

A producer registered in 1934 is entitled to keep his 1934 basic acreage for the same holding in later years. But once a producer has paid the increased contribution on excess acreage he is entitled in subsequent years to increase his basic acreage by the number of acres on which the extra contribution was paid (provided it was not refunded).

In cases where all or part of a holding with a basic acreage changes hands, the Board decides how much of the basic acreage is to be retained by the old occupier and how much is to pass to the new occupier. Generally the basic acreage will stay with the land in respect of which it was granted. In cases of exceptional hardship and unusual circumstances, the Board may allow such basic potato acreage as it may think proper, on application being made to it. Further, it may give a guarantee in advance that a future occupier shall have a certain basic acreage.

MARKETING NOTES

Quality Improvement.—The powers of the Board also enable it to improve the quality of potatoes placed on the market. It can fix grades under which potatoes are sold by producers, and it can prescribe the methods of grading, marking, packing, storing, transporting, etc., that may be used by producers. Further, the Board may seek to raise the standard of production by research and by giving advice to producers; it also has power to encourage, promote and conduct agricultural co-operation, research and education in connexion with the production and marketing of potatoes.

Conditions of Sale.—The Board may determine the terms on which potatoes, including growing potatoes, may be sold by registered producers. Before prescribing or prohibiting any method of sale on commission the Board must secure the approval of a general meeting or a poll of producers.

The Board may determine the persons to whom or through whose agency producers may sell their potatoes. A number of methods of direct sale by producers are exempted from this control, namely, sales in lots of one hundred-weight or less, sales in auction or customary markets, sales of new potatoes, and sales for manufacture by the purchaser. Sales to Government Departments, hotels, institutions, etc., and sales to retailers are also exempted from this provision, unless the Board issues a provisional prohibition. The provisional prohibition only becomes absolute if the producers in the area affected do not demand a poll on the question, or if, when a poll has been demanded, a majority of those voting are in favour of the prohibition.

Other Powers of the Board.—Credits may be granted by the Board to producers up to two-thirds of the prospective value of their sales. It may also circulate market information and *suggest* guiding prices to producers. There are no general powers to *fix* the prices at which registered producers may sell. The Board has the usual administrative powers to inspect producers' premises, and to demand statistics and other information from them.

Finance.—The funds of the Board will be derived from contributions payable by registered producers in respect of the acreage of potatoes grown by them. The ordinary contribution may not exceed 5s. per acre, or 10s. per acre if the registered producers in general meeting so resolve. The special contribution payable on acreage in excess of basic acreage may not exceed £5 per acre.

MARKETING NOTES

Agricultural Marketing Acts, 1931-33: Consumers' Committees.—The Prime Minister, on the recommendation of the President of the Board of Trade, has approved the reconstitution of the Food Council. The reconstituted Food Council will have the same terms of reference as hitherto.

The Minister of Agriculture and Fisheries and the Secretary of State for Scotland, after consultation with the President of the Board of Trade, have appointed the members of the Food Council as the Consumers' Committee for Great Britain under the Agricultural Marketing Act, 1931. This Committee, with the exception of the Scottish members, will also act as the Consumers' Committee for England. The Secretary of State for Scotland proposes to appoint the Scottish members, together with three others, as the Consumers' Committee for Scotland.

It will be the duty of the Consumers' Committees to consider and report to the appropriate Minister on the effect on consumers of any agricultural marketing scheme for the time being in force, and to consider and report upon consumers' complaints.

Communications for the Great Britain and English Committees should be addressed to the Secretary, Consumers' Committee for Great Britain (or for England as the case may be), Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Communications for the Food Council should be addressed as heretofore to the Board of Trade.

Sugar-Beet Contracts, 1934.—Following the announcement* made by the Minister of Agriculture and Fisheries in the House of Commons on July 27, 1933, that the Government had decided to continue, in respect of the 1934 crop, the subsidy on sugar and molasses manufactured from home-grown sugar-beet (with certain modifications in regard to the subsidy on molasses), the National Farmers' Union, representing the growers, and the General Committee of the United Sugar Industry, representing the factories, have agreed upon the terms of the contracts for next year's crop. Subject to the modifications mentioned below in respect of five factories, all factories offer the same contract, which is on a co-operative basis and on the same lines as that offered by the Anglo-Dutch group of factories

* The announcement is fully commented upon in the issue of this JOURNAL for September last, p. 556.

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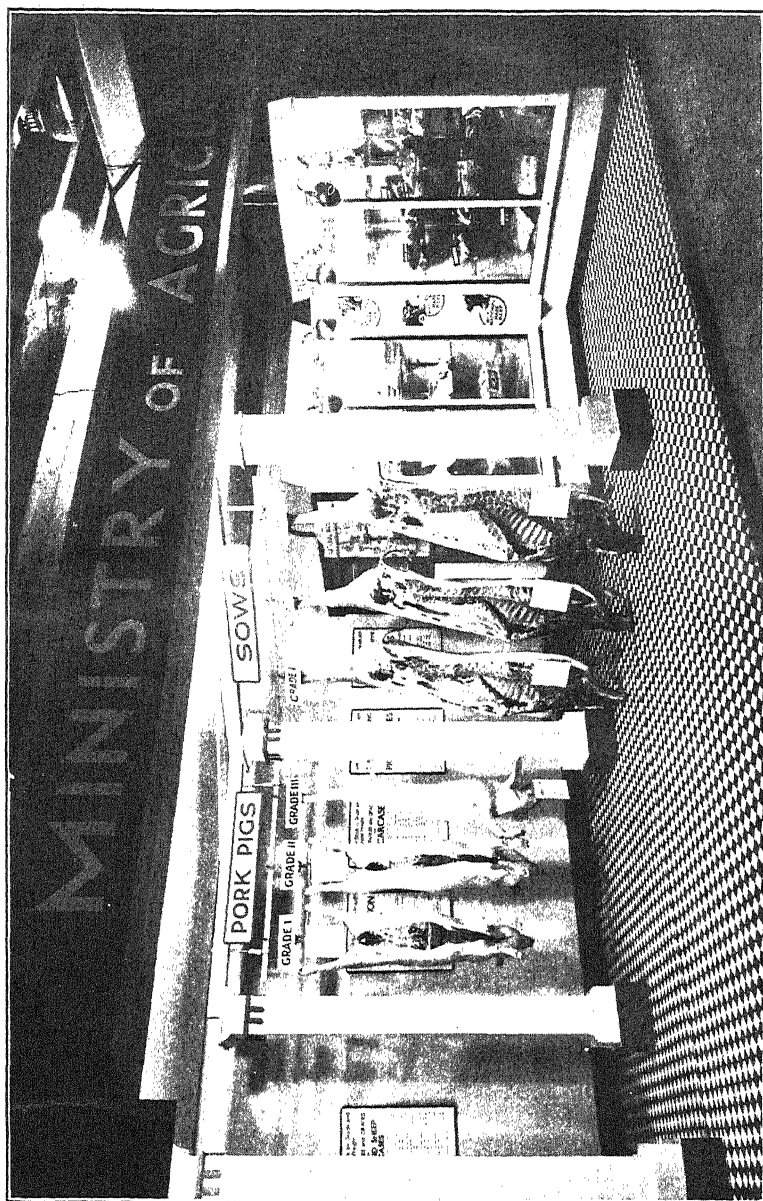
in the past three years. The terms of the contract provide that the "whole net proceeds" from the products manufactured at the factories shall be apportioned on the basis of 80 per cent. to the grower and 20 per cent. to the factory, until the grower's share is equivalent to a return of 45s. per ton of beets (washed and topped) of $15\frac{1}{2}$ per cent. sugar content, and thereafter on the basis of 50 per cent. to each party. The "whole net proceeds" are to be determined by adding to the gross receipts from manufactured products any unconditional State assistance and then deducting (1) manufacturing and establishment charges; (2) selling expenses (including Excise duty); (3) interest on working capital; and (4) the net increments (mentioned below) paid to growers in respect of sugar content in the beets in excess of $15\frac{1}{2}$ per cent. No deductions are to be made in respect of (1) depreciation; (2) directors' fees; (3) capital expenditure; and (4) expenses incurred in the diversion of beets from one factory to another. The grower is guaranteed a minimum price of 35s. per ton of $15\frac{1}{2}$ per cent. sugar content, except for the Allscott, Brigg, Kidderminster, Poppleton and Selby factories, for which the guaranteed minimum is 37s. per ton.

With all factories the grower has, however, the option of foregoing his participation in the "whole net proceeds" in respect of all or part of his crop. If he exercises this option, he will receive instead a fixed price payment of 37s. or 39s. as the case may be (i.e., 2s. per ton above the guaranteed minima in the co-operative contract) for beets of $15\frac{1}{2}$ per cent. sugar content.

Variations for differences in sugar content above or below $15\frac{1}{2}$ per cent. are in all cases at the rate of 2s. 6d. for each 1 per cent.

Sugar Production.—The total quantity of beet-sugar manufactured during November, 1933, was 2,521,016 cwt., making the total production for the season to date 5,536,735 cwt. The corresponding figures for last year were 2,355,758 cwt. and 3,913,201 cwt., respectively.

Wheat Act, 1932: Sales of Home-Grown Wheat—Cereal Year 1933-34.—Certificates lodged with the Wheat Commission covering wheat sales from the commencement of the cereal year on August 1 up to and including December 16 indicated sales of 13,636,653 cwt. of millable wheat.



BIRMINGHAM FAT STOCK SHOW, 1933. Portion of the Ministry's Stand.



BIRMINGHAM FAT STOCK SHOW, 1933. Portion of the Ministry's Stand.

MARKETING NOTES

Irish Free State: Pig Carcasses (Regulation of Export) Order, 1933.—The Irish Free State Department of Agriculture has made an Order, the Pig Carcasses (Regulation of Export) Order, 1933, under the powers conferred by the Agricultural Products (Regulation of Export) Act, 1933, reference to which was made in the September number of this JOURNAL (see page 552). The Order, which came into operation on December 1, 1933, prohibits the export from the Irish Free State to Northern Ireland of the carcass of a pig except under and in accordance with an export permit issued under the Order, and provides penalties for exporting, or attempting to export, the carcass of a pig in contravention of the Order. "Carcass" includes part of a carcass.

Marketing of Fat Stock by Grade and Dead Weight.—The facilities provided by the Ministry for the sale of fat cattle, lambs and fat ewes by grade and dead weight, have now been extended to cover all classes of cattle, calves, sheep and pork and other pigs (excluding those contracted for delivery under the Pigs Marketing Board Scheme). These experimental schemes are in operation at the wholesale meat markets at London (Smithfield), Birmingham and in the Birkenhead, Leeds and Bradford areas.

The grades and definitions for the various classes of fat stock which are included under the schemes were drawn up after consultation with the trade and with the approval of the National Farmers' Union. A demonstration of the grades of carcasses of calves, sheep and pigs was given on the Ministry's stand at the recent Birmingham Fat Stock Show (See accompanying illustrations) and a similar demonstration of cattle and sheep carcasses was staged at the Smithfield Club Show. These demonstrations aroused considerable interest among farmers and meat traders.

The classes and grades are as follows:—

CATTLE.			
<i>Class.</i>			<i>Grades.</i>
Bullocks and Heifers	.. ..	Super*	I*, II*, III*
Cow Heifers	.. ..	..	I*, II*, III
Cows	.. ..	..	I, II, III
Bulls and Staggs	.. ..	..	I, II, III
*Would normally qualify for the National Mark.			
VEAL.			
<i>Class.</i>	<i>Weight Ranges.</i>		<i>Grades.</i>
	<i>(Dressed Carcass Weight.)</i>		
Bobby Veal	(a) 80 lb. and under	}	I, II, III
	(b) Over 80 up to 120 lb.		
	(c) Over 120 lb.		

MARKETING NOTES

Veal	(a) 80 lb. and under	}	I, II, III
	(b) Over 80 up to 120 lb.		
	(c) Over 120 lb.		
Runner Veal	(a) 80 lb. and under	}	I, II, III
	(b) Over 80 up to 120 lb.		
	(c) Over 120 lb.		

SHEEP.			
<i>Class.</i>	<i>Weight Ranges.</i>		<i>Grades.</i>
	<i>(Dressed Carcass Weight.)</i>		
Lamb	32 lb. and under	}	I, II, III
	32 to 40 lb.		
	40 to 48 lb.		
Ewes and Rams	40 lb. and under	}	I, II, III
	40 to 56 lb.		
	56 to 72 lb.		
	Over 72 lb.		
Other Sheep, Hoggs, Wethers, etc.	40 lb. and under	}	I, II, III
	40 to 56 lb.		
	56 to 72 lb.		
	Over 72 lb.		

PIGS.			
<i>Class.</i>	<i>Weight Ranges.</i>		<i>Grades.</i>
	<i>(Dressed Carcass Weight.)</i>		
Pork Pigs	(a) 48 lb. and under	}	I, II, III
	(b) Over 48 to 64 lb.		
	(c) „ 64 to 80 lb.		
	(d) „ 80 to 100 lb.		
	(e) „ 100 to 120 lb.		
	(f) „ 120 to 140 lb.		
	(g) „ 140 lb.		
Sows	(a) 160 lb. and under	}	I, II, III
	(b) Over 160 to 200 lb.		
	(c) „ 200 to 240 lb.		
	(d) „ 240 lb.		

The price quotations, which are obtained and forwarded to the farmer by the Ministry's grader, are based on the carcass grades reached by the animals and on the dead weight per lb. (sinking the offal).

All gradable animals (i.e., excluding rejects) forwarded under the various schemes are insured by the wholesaler, to whom the animals are consigned, against transit risks and the risk of condemnation for disease. The insurance premiums are as follows:—

<i>Class.</i>	<i>Rate of Premium per head.</i>					
					<i>s.</i>	<i>d.</i>
Bullocks	}	2	0
Maiden Heifers						
Cow Heifers						
Bulls						
Staggs (Seggs)						
Cows	4	0
Calves	2	
Sheep and Lambs	1	
Pigs (up to 120 lb.*)	4	
„ (over 120 lb.*)	6	
Sows	1	0

*Dressed cold carcass weight.

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The cost of insuring gradable animals is borne equally by the farmer and the wholesalers.

The only other charges borne by the farmer are cost of transporting the animals to the grading centre and a small charge to cover the Ministry's grading costs, at the rate of 3*d.* per head on all classes of stock other than cattle, on which the rate is 2*s.* per head, except on those that would receive the National Mark, which are at present graded free of charge.

As indicated in the December issue of this JOURNAL, with reference to the scheme for sheep and lambs, standard specifications have been drawn up by the Ministry for dressing carcasses, and conditions are laid down as to the weighing of carcasses of all classes of stock consigned for sale by grade and dead weight.

Full particulars of these schemes (including conditions of sale) are contained in revised Marketing Leaflets No. 27 (Cattle and Calves) and No. 46 (Sheep and Lambs), and in Marketing Leaflet No. 63 (Pigs), which may be obtained free of charge, on application to the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

During the year ended Nov. 30, 1933, the scheme for the consignment of cattle for sale on the basis of dead weight and National Mark grade made considerable progress. During the 12 months, 262 consignments, involving 1,755 cattle, were dealt with at the Ministry's grading centres as compared with 122 consignments, comprising 1,011 cattle, received during the year ended Nov. 30, 1932.

Under the schemes introduced in June and August last for lambs and ewes, a total of 9,990 lambs and 2,010 ewes were dealt with up to Nov. 30, 1933, at Manchester and Liverpool and 4,339 lambs and 168 ewes at the National Mark meat grading centres at Birmingham, London and Leeds.

National Mark Vegetables.—The National Mark Vegetables Trade Committee has recommended that National Mark schemes for Cabbage Greens and Cabbages, Red Beet and Salad (Spring) Onions, should be introduced in 1934.

Cabbage Greens and Cabbages.—This scheme provides for three grades, viz., Selected (Greens), Selected Hearted and Selected Hearted (Large). Greens of the "Selected" grade, which may be packed only during the period Dec. 1 to May 31 in each year, must weigh not more than 1½ lb.; "Selected Hearted Cabbages" must be between 1½ lb.

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and 3 lb., and "Selected Hearted (Large)" between 3 lb. and 6 lb. All grades should normally be packed in standard non-returnable wooden crates, but consideration will be given to applications to use other types of crates.

Authority to apply the Mark will be granted to individual growers or packers with an estimated annual output for sale of not less than 10 tons of cabbages, or whose total area devoted to the production of cabbage in a year is not less than 2 acres, and to approved associations of growers without regard to output.

Red Beet.—Red Beet packed under the National Mark will be marketed under two grades, viz., Selected Bunched and Selected Topped. Each beet must be between 2 and 4 in. diameter at its widest transverse section, and the beets in any container must be reasonably uniform in size. The "Selected Bunched" grade must be marketed in bunches of four and will normally be packed in standard non-returnable crates. The "Selected Topped" grade will be packed in standard non-returnable crates with cardboard lining, or in non-returnable sacks holding approximately 56 lb., but consideration will be given to applications from growers to use alternative forms of containers.

The type of beet (i.e., "long," "round" or "oval") in a container must be declared on the National Mark label, together with the count or minimum net weight of the beet. Authority to apply the Mark will be granted to growers with a minimum area of $\frac{1}{4}$ acre devoted to the cultivation of red beet, to merchant packers repacking 50 tons in a year, and to approved associations of growers without regard to output.

Salad (Spring) Onions.—The proposed grades for salad (spring) onions packed under the National Mark are "Selected" and "Selected (Large)." Salad onions of the "Selected" grade must be not less than $\frac{1}{4}$ in. nor more than $\frac{1}{2}$ in. and those of the "Selected (Large)" grade must be not less than $\frac{1}{2}$ in. nor more than 1 in. in widest diameter, measured at the bulb or basal part of the stem. The onions must be packed in bunches measuring at the tie not less than 4 in. nor more than 5 in., or in half-bunches measuring not less than $2\frac{1}{2}$ in. nor more than $3\frac{1}{2}$ in. The onions must be packed in standard non-returnable wooden crates, on which shall be declared the number of bunches or bundles in multiples of three, two half-bunches being considered equivalent to one bunch. Consideration will be given to

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applications from growers or packers desiring to use other forms of containers.

Authority to apply the Mark may be granted to growers with an area of not less than $\frac{1}{4}$ acre devoted to the production of salad (spring) onions, to merchant packers who bunch or bundle and pack the equivalent of at least 1,000 dozen bunches in a year, and to approved associations of growers without regard to output qualification.

Regulation of Egg Imports.—The Marquess of Linlithgow, as Chairman of the Market Supply Committee, received, on December 14, a joint deputation from the Poultry Committee of the National Farmers' Union and the National Poultry Council with regard to the importation of eggs during the coming season. The deputation pressed their case for regulation of imports of eggs during the months of February to July, 1934, in anticipation of the Report of the Eggs and Poultry Reorganization Commission, and emphasized the serious difficulties with which the industry would be faced if imports remained unregulated. Lord Linlithgow, in reply, stated that the Market Supply Committee had already been asked by Mr. Elliot to examine the situation in regard to egg supplies as a matter of urgency, and he promised that they would give it their immediate and most careful attention.

Federation of Dressed-Poultry Packers.—The National Mark scheme for dressed poultry recognizes the need for packers to co-operate in the development of a common sales policy, and it is provided in the certificate of authorization under the scheme that an authorized packer shall, if so required, join any association or federation of packers of National Mark dressed poultry, established for the purpose of regulating and developing the distribution of home-produced poultry packed under the National Mark. During December, two representative meetings of National Mark packers were held with the object of forming a Federation for this purpose.

National Mark Wheat Flour.—Under the National Mark flour scheme, associations of grocers and bakers may receive authority for those of their members who are registered for the purpose to repack, in packets bearing the National Mark, all-English National Mark wheat flour that has been purchased in bulk by the Association. The first of the grocers' associations to be so authorized is the

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Kettering and District Grocers', Tea Dealers' and Provision Merchants' Association, whose Balance Sheet and Secretary's Report for the year ended Sept. 30, 1933—the first year of its operation under the scheme—have now been published. During the year, the nine registered members of the Association retailed between them 378 cwt. of National Mark Plain Flour, 82 cwt. of National Mark Self-raising Flour and 6 cwt. of Yeoman Flour, making a total of 466 cwt., or just over 23 tons.

No profit was taken by the Association on the sale of flour to its registered members, and owing to the members' prompt payment of their accounts, the Association was able to secure all available discounts.

As a result of the Association's operations, National Mark wheat flour has become widely known and appreciated in the Kettering district, and associations in other districts have made inquiries as to its methods of working.

National Mark Malt Products.—On the recommendation of the National Mark Malt Products Trade Committee, the conditions of authorization of packers in the scheme will be amended as from July 1, 1934, to require that not less than 5 per cent. of each packer's total output of pharmaceutical malt extract shall be packed in containers bearing National Mark labels.

Displays of National Mark Produce.—The Ministry will occupy a stand in the Empire Section of the British Industries Fair, Olympia, from Feb. 19 to March 2, 1934. A portion of the stand will be occupied by an exhibit arranged by the Pigs and Bacon Marketing Boards and the remainder will be devoted to National Mark products.

A stand has also been taken at the Manchester Grocers' and Allied Trades Exhibition, to be held at Belle Vue, Manchester, from April 17 to 28, 1934, for the purpose of National Mark propaganda. A working demonstration of the grading and packing of eggs under the National Mark Scheme will be included on the stand.

Publicity for National Mark Products.—The Ministry, in co-operation with the National Federation of Women's Institutes, is arranging for a National Mark flour cookery competition, open to county federations of Women's Institutes, to be held at the Crystal Palace in March next in association with the South London Exhibition. As a preliminary to the competition, a series of practical

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demonstrations of the recipes to be used will be given by cookery experts at twelve centres in different parts of England and Wales during February. As most of the members of women's institutes live in rural areas, where a good deal of cooking is done on oil stoves, the co-operation of two manufacturers of British oil stoves has been secured for the purpose of these demonstrations, in which National Mark flour and eggs will be used.

A National Mark Shopping "Week" is being held in Exeter from Jan. 22 to 27. The principal feature of the "Week" will be a National Mark and Home Industries Exhibition in the Civic Hall, Queen Street, Exeter.

Egg grading and cookery demonstrations will be staged at the Exhibition, as well as a special display of British-grown spring flowers. A shop window display competition has been arranged for local retailers who stock National Mark products, and National Mark film displays will be given in the Exeter cinemas for the benefit of housewives and senior school children.

Western Australia : Grading of Potatoes. —Revised Regulations made under Section 9 of the Agricultural Produce Act, 1929, for the compulsory grading of potatoes grown in Western Australia, and intended for sale in any State of the Commonwealth of Australia, were published on August 11, 1933. The revised grades are as follows:—

Grade 1 } Both grades are for potatoes not less than 3 oz. each in
Grade 2 } weight. Grade 1 must be free from second growth and damage. Grade 2 may include damage which would be removed by the ordinary process of paring.

New Potatoes: to weigh not less than $1\frac{1}{4}$ oz. each during July, August and September, and not less than 2 oz. each in all other calendar months.

Seed Potatoes: to be of one variety and to weigh not less than $1\frac{1}{4}$ oz. each.

Stock Food: Potatoes intended for feeding to stock.

Potatoes are deemed to comply with the standard of a grade if at least 95 per cent. by weight comply with the standard.

Potatoes intended for human consumption or for seed must be packed in new or clean second-hand bags of good quality, or in other containers approved by the Department of Agriculture.

The Butter and Cheese Trade in Germany.—The Reich Ministry for Food and Agriculture has recently published draft Decrees dealing with the butter and cheese trade

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in Germany. These Decrees prescribe, in great detail, official grade-standards and marks to be applied to home-produced and imported butter and cheese offered for sale on the domestic market.

Butter.—Certain marks for the grading and identification of butter are compulsory and are referred to below. Apart from them, only four marks on wrappings or containers are allowed:—(a) indication of weight; (b) control-number; (c) indication as to whether the butter is salted; (d) for imported butter, any official control-stamp of the country of origin.

All home-produced butter must be graded in accordance with the national standards prescribed in the Decree. Grading is based on a scoring system. Perfect butter can score 20 points—10 for taste, 3 for odour, 3 for composition, 2 for condition and 2 for appearance. There are 5 grades of butter, and each grade, with the exception of the lowest, must score a certain minimum number of points in order to qualify. The full table is as follows:—

<i>Grade Designation</i>	<i>Total Score</i> (points)	<i>Minimum Score</i> <i>for Taste</i> (points)
Branded Butter (Markenbutter)	17 and over	9
Fine Dairy Butter (Feine Molkereibutter)	16 and over	8
Dairy Butter (Molkereibutter)	15 and over	7
Farm Butter (Landbutter)	13 and over	6
Cooking Butter (Kochbutter)	—	—

When butter is sold, two marks appearing on the wrapper (or, in the case of open sale, on the counter where it is sold) must stand out above the rest. These are its grade designation (unabbreviated) and its origin, in the case of German butter the word “Deutsche.” “Fine Dairy Butter” and “Dairy Butter” must also show the name and trade mark of the producer or, alternatively, of any subsequent seller. Blending of different grades or of butter from different areas of production is prohibited, except in the case of “Fine Dairy Butter” and “Dairy Butter,” where the blender must place his name and trade mark on the resulting product.

“Branded butter” is rigorously supervised. It may only be repacked for sale on the premises of the producer himself, or other premises specially registered. If it is repacked for sale by retail, it must be wrapped in parch-

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ment paper and put up in rectangular blocks of prescribed size as follows:—

Blocks of 500 gr.	148 mm. × 105 mm. × 35 mm.
„ „ 250 gr.	105 mm. × 74 mm. × 35 mm.
„ „ 125 gr.	74 mm. × 52 mm. × 35 mm.

Cheese.—The provisions relating to the sale of cheese are similar to those for butter, but only one quality factor for cheese is taken into account, namely, the butter-fat content. There are eight different grades of cheese, as follows:—

<i>Designation.</i>	<i>Minimum Fat Content of Dry Matter. Per cent.</i>
(a) Double Cream Cheese	60
(b) Cream Cheese	50
(c) Full Fat Cheese	45
(d) Fat Cheese	40
(e) Three-quarter Fat Cheese	30
(f) Half Fat Cheese	20
(g) One-quarter Fat Cheese	10
(h) Skim-Milk Cheese	less than 10

The provisions for the marketing of cheese are as strict as those for butter. All home-produced cheese except skimmed-milk cheese must carry a plain mark to indicate its origin and fat grade. Hard or semi-hard cheese which is not packed, must be stamped, stencilled or branded: other kinds of cheese, which are to be suitably packed, must carry marks on the containers. The form of the mark and the minimum size of letters and figures to be used are laid down. An example is given below:—

Bavarian Full Fat Cheese
45% Fat in dry substance
1200

In this mark the top line shows where the cheese was produced, and its grade; the second line, the percentage of its fat content; and the third, the control-number of the person or firm who applied the mark. In the case of hard cheese, semi-hard cheese for cutting and soft cheese manufactured in squares or cubes of at least 200 grammes, a rectangular border must surround the mark; in other cases, a border is not necessary. Pressed cheese must bear the word “Schmelzkäse” (pressed cheese) on its mark. The producer or the packer, according to the variety of the cheese, is responsible for applying the mark: but every subsequent vendor is responsible for its accuracy.

In no circumstances must the fat grade of the cheese be withheld. If in the course of retail distribution, cheese is

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cut or taken from its packet, labels must be substituted for the mark; and the fat grade must be quoted on price-lists, in advertisements and even on menus.

Imported Butter and Cheese.—Provision is also made in the Decrees for the grading and marking of imported butter and cheese. Every receptacle containing imported butter must be plainly marked in Roman letters with the name of the country of origin (for instance, DANISH BUTTER). Otherwise it must be placed in bond and marked before it is removed to any place within German Customs territory. The grade designations "Branded Butter," "Fine Dairy Butter" or "Dairy Butter" may only be used on imported butter if an official certificate issued by the country of origin shows that the butter complies with the German requirements for those grades.

Similar regulations as to marking and placing in bond apply to imported cheese, except skimmed-milk cheese. The name of the country of origin must be written in German. When such cheese is offered for sale, it must be marked with the fat-content of the dry matter. It may also bear one of the grade designations of German-produced cheese or a foreign designation which means the same; but only if its fat-content is high enough to qualify for the grade in question.

Certain parts of the Cheese Decree, namely, the provisions relating the types of cheese affected, the classification of types according to fat-content, and the issue of control numbers, came into force on Nov. 1, 1933. The remainder of the Cheese Decree and the Butter Decree are to come into operation in the near future.

Argentina: Act to Create a National Meat Board.—An interesting and important project to create a National Meat Board has recently been passed into law by the Argentine Legislature. The Board will operate as an autonomous entity. Its nine members will be appointed by the Executive Power with the approval of the Senate, and will represent the various interests concerned. In addition to three direct representatives of the Executive Power, having knowledge of the meat industry and trade and of the different livestock zones of the country, there will be two representatives of the Argentine Rural Society, two representatives of the Rural Societies of the interior, one representative of the private frigorificos and one representative of producers' co-operative meat-packing concerns. The representatives of the Rural Societies and of the producers' co-operatives must be livestock producers.

A paid whole-time President will be elected from among the direct representatives of the Executive Power; the members will act in an honorary capacity. Except as regards the President, the period of office will be four years, half the membership being renewed every two years.

The Board will have wide powers for controlling the meat industry. Some of its most important functions will be to make regulations for the classification of livestock and meat destined for home consumption

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or export, and of all livestock products and by-products, and to fix the periods and zones of the country in which they shall apply; to establish regulations relating to the class, quality, packing and conditions of transport of all livestock products for export, and to prohibit shipments which do not comply with these regulations; to create, either directly or by agreement with any existing or public body, the frigorificos and commercial or industrial organizations that may be necessary in the home or foreign market in the interests of the livestock industry and for the lowering of prices to consumers of livestock products. These institutions will have as their object the handling of livestock, the packing of meat and meat by-products, the sale of these by wholesale or retail, and the installation and operation of cattle markets.

It is apparently contemplated that these organizations will be owned and operated by livestock producers on a co-operative basis. Once established in accordance with the provisions laid down in the Act, they will be independent of the Meat Board, although subject to such general powers of inspection and supervision as are established in this Act and previous legislation.

The National Meat Board will also be empowered to organize commercial propaganda directed to the expansion of markets at home and abroad; to conduct investigations into the operation of existing legislation and advise the Executive Power on all matters relating to the livestock industry; to supervise the use of shipping space and to regulate shipments; and to provide statistical and economic intelligence relating to the livestock and meat trade.

The Board will be financed from four sources:—(1) fines for the infraction of this and other legislation relating to the meat trade, (2) donations, (3) interest on investments, and (4) a contribution up to 1½ per cent. of the proceeds accruing from sales of cattle, sheep and pigs intended for home consumption or export. The Board will fix the rate of contribution, taking into account the general and local conditions of the livestock industry and the amount of accumulated funds of the Board. Of these funds, which will accumulate annually, 20 per cent. will be disposed of to meet the general expenses of administration and of propaganda services, etc., and 80 per cent. will be employed exclusively in the creation of the commercial and industrial organisations and frigorificos referred to above.

Finally, the Act provides for the establishment of a "National Frigorifico of the Federal Capital," constituted jointly by the Municipality of Buenos Aires and the National Meat Board, as representing livestock producers. The Executive Power is authorized to arrange with the Municipality for the transfer of the existing municipal abattoir and frigorifico in exchange for shares in the new entity. The Meat Board will be required to subscribe shares to the same amount in the National Frigorifico, but may later, subject to the approval of the Executive Power, transfer all its rights in the frigorifico to an organization of livestock producers established in accordance with the provisions of this Act.

The National Frigorifico will be empowered, *inter alia*, to slaughter livestock and manufacture by-products either on its own account or for others; to establish markets and shops for the sale of its meat or meat consigned from regional frigorificos or factories belonging to breeders; to provide cold-storage facilities for the preparation of livestock for export; and to instal, acquire or lease transport facilities.

For the time being, the National Frigorifico will be administered by a directorate composed of a President, one member nominated by the Municipality, and three members appointed by the National Meat Board. When a co-operative society of producers has been organized under the provisions of this Act, the three members representing the National Meat Board in the administration of the National Frigorifico will be replaced by three members elected by the society. The President and members will hold office for four years and will receive payment.

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It is understood that steps have already been taken by a number of Argentine cattle breeders to form a co-operative society with the object of slaughtering and exporting meat produced by members direct to importers in the United Kingdom. A copy of the statutes of the society has been presented to the Argentine Ministry of Agriculture, and a circular is being sent to all producers inviting their adherence.

Report of the Milk Board, Victoria.—The Report of the Milk Board appointed in Victoria, Australia, under the Milk Board Act, 1932, has been received. The Board was appointed to inquire into:—

- (a) The regulation and control of the milk supply of Melbourne; and
- (b) The better and more economic collection, transportation, treatment and distribution of milk, including the prices paid to producers and paid by consumers.

The Chairman of the Board was the Head of the Livestock Division of the Department of Agriculture, and the other members were two representatives of producers, one of distributors and one of consumers.

Under existing legislation affecting the milk industry, as consolidated in the Milk and Dairy Supervision Act, 1928, wide powers are available for the protection of the public health, but hitherto there has been no provision for the control and regulation of the milk supply in its economic aspects. The Board was convinced by its investigations that, so far as the economic side of the industry is concerned, conditions are extremely unsatisfactory. Far-reaching measures for reorganization have been recommended in the Report with the unanimous agreement of the various interests represented on the Board. It was admittedly strongly influenced by the Report of the Reorganization Commission for Milk and Milk Products in England and Wales.

As regards production, the Board was impressed chiefly by the difficulties of producers occupying farms situated conveniently for direct supply to the city, who specialize in regular deliveries of level dairies, but have higher production costs. In recent years these have met with intense competition and undercutting from factories and depôts situated within a radius of 80 miles, or more, from Melbourne. The latter derive their supplies from producers with lower costs, and for the most part do not maintain regular supplies to the city, being also engaged in manufacture. The evidence indicated that regular suppliers of level dairies have recently been receiving a price per gallon equivalent to 6d. to 8d. ex farm; their production costs amount to 9d. to 1s. per gallon, and there is also the risk of bad debts.

The distributive position was also investigated. Here, too, intense competition has led to undercutting. Producer-retailers now account for only 5 or 6 per cent. of the total supply, but by undercutting they still influence prices in some areas. In the retailers' view, however, the chief offenders are "yodellers," or milk hawkers, who sell on the street for cash after the normal delivery time, without having regular rounds. Moreover, the total number of licensed milk retailers has increased by over 4 per cent. in four years, although producer-retailers have greatly decreased in numbers and many established retailers have bought out competitors. Not only has the excessive number of retailers led to price cutting, but as a result of the overlapping of rounds, the wide area covered by them and the low gallonage per round, distributive costs have been very high. In one street it was found that 11 adjacent houses were supplied by 11 different retailers. It is estimated that the retailers' margin varies between 8½d. and 1s. 1d. per gallon. The report is rather hesitant and inconsistent on this subject, but finally suggests that no excess profits are at present being made by retailers and that under existing conditions costs cannot be appreciably reduced, but that with rationalization considerable reductions might be made.

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To carry out the necessary reorganization of the liquid milk supply the Report recommends the establishment of a statutory Milk Board. The alternative of a municipal authority on the lines of the Wellington system was considered but rejected. The Board would consist of a Chairman with technical knowledge, and four members representative of the same interests as the four members of the reporting Board.

The first duty of the Board would be to control the liquid milk supply with the object of stabilizing it. The liquid milk market would be reserved for a special class of certificated producers*, who would be required to supply milk of a statutory grade specified in their certificates, to maintain adequate hygienic conditions of production, and to make suitable provision for producing level supplies throughout the year and for dealing with surplus. Producer-retailers would not be exempt. (Presumably factories or depôts could not supply milk to Melbourne unless all producers delivering to them were certificated.)

Secondly, the Board would regulate both producers' and retailers' prices for liquid milk supplied to Melbourne. It is contemplated that at the outset this would be attempted by regulating the terms of contracts; but the Board would have power to assume the ownership of all liquid milk supplies if this were found necessary.

Thirdly, the Board would exercise a control over distribution. It would require all milk carriers, retailers, roundsmen and retailers' vehicles to be registered with it. It would determine the number of retail licences granted to retailers and reduce them where there was evidence of undue overlapping or excessive costs in delivery owing to the number of retailers operating in any district. In the latter case, compensation would be granted from a fund derived from a levy on retailers' sales. Not only would the holding of licences be dependent on the maintenance of suitable hygienic conditions, as hitherto, but the Board would also have power to withhold them on grounds of doubtful financial stability or character, or of bad health. The Board would further have power to introduce and enforce a system of "zoning" for the distribution of milk in Melbourne, with the object of reducing overlapping and unnecessary distributive costs. In addition, it is recommended that a limit should be placed on the hours of delivery, in order to check undercutting, reduce distributive costs and facilitate inspection.

Finally, as regards the quality of milk, the Report recommends that three grades, first proposed in the legislation of 1923, should be adopted by the new Board. These are:—Special Grade milk for infants (raw or pasteurized), Grade A raw milk, and Grade A pasteurized milk. The two former grades would be supplied only from tuberculin-tested cows. All milk for the liquid market would have to conform to one of these grades; in practice, most milk would be Grade A pasteurized. All milk sold by retail would be bottled.

The scheme proposed in this Report differs widely from that of the English Reorganization Commission. It is primarily concerned with improving the position of suppliers to the Melbourne market, who produce only a comparatively small proportion of the milk supplies of the State. It does not attempt to establish a pool, but aims rather at creating a monopoly in the Melbourne market for a privileged class of producers, who, however, are to be more strictly regulated than hitherto. It is hoped that they will obtain better returns as the result of the limitation of competition, the fixing of statutory prices and supervision of contracts, and the reduction of distributive costs through compulsory measures of rationalization. At the same time, consumers will be protected by the fixing of maximum retail prices and will be supplied with guaranteed milk of a higher quality.

* A comparison on this point with the proposals of the Reorganization Commission appears to be based on a misconception of the latter. It was not of course intended in these proposals that all producers for the liquid market in England and Wales would have to be "accredited."

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Under existing legislation affecting the milk industry, as consolidated in the Milk and Dairy Supervision Act, 1928, wide powers are available for the protection of the public health, but hitherto there has been no provision for the control and regulation of the milk supply in its economic aspects. The Board was convinced by its investigations that, so far as the economic side of the industry is concerned, conditions are extremely unsatisfactory. Far-reaching measures for reorganization have been recommended in the Report with the unanimous agreement of the various interests represented on the Board. It was admittedly strongly influenced by the Report of the Reorganization Commission for Milk and Milk Products in England and Wales.

As regards production, the Board was impressed chiefly by the difficulties of producers occupying farms situated conveniently for direct supply to the city, who specialize in regular deliveries of level dairies, but have higher production costs. In recent years these have met with intense competition and undercutting from factories and depôts situated within a radius of 80 miles, or more, from Melbourne. The latter derive their supplies from producers with lower costs, and for the most part do not maintain regular supplies to the city, being also engaged in manufacture. The evidence indicated that regular suppliers of level dairies have recently been receiving a price per gallon equivalent to 6d. to 8d. ex farm; their production costs amount to 9d. to 1s. per gallon, and there is also the risk of bad debts.

The distributive position was also investigated. Here, too, intense competition has led to undercutting. Producer-retailers now account for only 5 or 6 per cent. of the total supply, but by undercutting they still influence prices in some areas. In the retailers' view, however, the chief offenders are "yodellers," or milk hawkers, who sell on the street for cash after the normal delivery time, without having regular rounds. Moreover, the total number of licensed milk retailers has increased by over 4 per cent. in four years, although producer-retailers have greatly decreased in numbers and many established retailers have bought out competitors. Not only has the excessive number of retailers led to price cutting, but as a result of the overlapping of rounds, the wide area covered by them and the low gallonage per round, distributive costs have been very high. In one street it was found that 11 adjacent houses were supplied by 11 different retailers. It is estimated that the retailers' margin varies between 8½d. and 1s. 1d. per gallon. The report is rather hesitant and inconsistent on this subject, but finally suggests that no excess profits are at present being made by retailers and that under existing conditions costs cannot be appreciably reduced, but that with rationalization considerable reductions might be made.

MARKETING NOTES

To carry out the necessary reorganization of the liquid milk supply the Report recommends the establishment of a statutory Milk Board. The alternative of a municipal authority on the lines of the Wellington system was considered but rejected. The Board would consist of a Chairman with technical knowledge, and four members representative of the same interests as the four members of the reporting Board.

The first duty of the Board would be to control the liquid milk supply with the object of stabilizing it. The liquid milk market would be reserved for a special class of certificated producers*, who would be required to supply milk of a statutory grade specified in their certificates, to maintain adequate hygienic conditions of production, and to make suitable provision for producing level supplies throughout the year and for dealing with surplus. Producer-retailers would not be exempt. (Presumably factories or depôts could not supply milk to Melbourne unless all producers delivering to them were certificated.)

Secondly, the Board would regulate both producers' and retailers' prices for liquid milk supplied to Melbourne. It is contemplated that at the outset this would be attempted by regulating the terms of contracts; but the Board would have power to assume the ownership of all liquid milk supplies if this were found necessary.

Thirdly, the Board would exercise a control over distribution. It would require all milk carriers, retailers, roundsmen and retailers' vehicles to be registered with it. It would determine the number of retail licences granted to retailers and reduce them where there was evidence of undue overlapping or excessive costs in delivery owing to the number of retailers operating in any district. In the latter case, compensation would be granted from a fund derived from a levy on retailers' sales. Not only would the holding of licences be dependent on the maintenance of suitable hygienic conditions, as hitherto, but the Board would also have power to withhold them on grounds of doubtful financial stability or character, or of bad health. The Board would further have power to introduce and enforce a system of "zoning" for the distribution of milk in Melbourne, with the object of reducing overlapping and unnecessary distributive costs. In addition, it is recommended that a limit should be placed on the hours of delivery, in order to check undercutting, reduce distributive costs and facilitate inspection.

Finally, as regards the quality of milk, the Report recommends that three grades, first proposed in the legislation of 1928, should be adopted by the new Board. These are:—Special Grade milk for infants (raw or pasteurized), Grade A raw milk, and Grade A pasteurized milk. The two former grades would be supplied only from tuberculin-tested cows. All milk for the liquid market would have to conform to one of these grades; in practice, most milk would be Grade A pasteurized. All milk sold by retail would be bottled.

The scheme proposed in this Report differs widely from that of the English Reorganization Commission. It is primarily concerned with improving the position of suppliers to the Melbourne market, who produce only a comparatively small proportion of the milk supplies of the State. It does not attempt to establish a pool, but aims rather at creating a monopoly in the Melbourne market for a privileged class of producers, who, however, are to be more strictly regulated than hitherto. It is hoped that they will obtain better returns as the result of the limitation of competition, the fixing of statutory prices and supervision of contracts, and the reduction of distributive costs through compulsory measures of rationalization. At the same time, consumers will be protected by the fixing of maximum retail prices and will be supplied with guaranteed milk of a higher quality.

* A comparison on this point with the proposals of the Reorganization Commission appears to be based on a misconception of the latter. It was not of course intended in these proposals that all producers for the liquid market in England and Wales would have to be "accredited."

JANUARY ON THE FARM

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THE planning of farm work at this time of the year is largely dependent upon the weather, and January is one of those months when anything may happen. The year 1933 will be long remembered for its unusual weather, and in particular for its comparative dryness and high sunshine figures. Anticipations that the rainfall deficiency would be made good by a wet December have not materialized. Rarely has the ground been so dry as it is at the time of writing (mid-December) and one hesitates to forecast the possibilities for January. Such factors as this represent some of the uncertainties that invest farming with the interest and contrast that are denied to most other industries. Few factors, indeed, exert a more dominating influence on farming methods and policy than the weather, and with the arrival of the time of good resolutions it is desirable to reserve a place for the capacity to do all things in their season and to employ the weather to the best advantage. These rules must always have a definite place in the foundations of good farming. It is never safe to assume too much where the weather is concerned, but to be abreast with work is to be prepared for all contingencies. The value of the tractor may be particularly emphasized in this respect.

In fine, open weather progress may be made with the preparation of arable land for spring corn. It is becoming increasingly appreciated that one of the secrets of a successful oat crop is early seeding, and in many parts one may contemplate seedings during February. This necessitates early preparation of the seed bed, though it should be emphasized that the suitability of soil conditions must determine the exact date of seeding. Ground that has been ploughed following roots is in wonderful condition this winter, and few stoppages have occurred so far. This is likely to be beneficial for cereal crops in 1934, since the contribution of a suitable tilth is considerable.

The carting out of farmyard manure is another routine job when conditions are suitable. Frost is generally useful in this connexion, since it permits carting on to land that

JANUARY ON THE FARM

is otherwise too sodden. There are many aids that now minimize the difficulties where land is wet, and in particular pneumatic-tyred carts, which are by no means as general as their value merits. A custom that could be more extensively practised is that of advancing the date of application of artificial fertilizers. For some years past the writer has applied phosphates and potash in December and January, so probably ensuring that the manures are more completely mixed with the soil than if applied immediately before the root crops are drilled. It also enables one to get another job done at a time when useful work is least plentiful, and eases the load in spring when so many things claim attention.

Grass Land.—The appearance of grass land in January is very largely determined by the season. It is never altogether desirable to see grass growing during January, for it is almost a certainty that it will be wasted by the later frosts. Farmers who have had considerable experience affirm that an open winter is also never a really satisfactory one for the behaviour of grass land in the subsequent grazing season, thus believing in the value of rest from growth.

The significance of grass land in modern agriculture suggests that more thought and care should be devoted to its management; and it is sometimes possible in the first three months of the year to pay some attention to what are known as cultural treatments. The harrowing of grass is an old-established custom, that mainly brings about the distribution of the droppings of live stock, and to a slight extent aerates the surface. When grass land has a surface mat of decayed roots and vegetable matter it is necessary to appreciate the need for drastic treatment that will penetrate the mat and reach the soil level. Ordinary harrowing is ineffective in this sense, and some of the most valuable additions to the range of farm machinery in recent years are the types of grass land harrows that have the capacity for penetrating matted turf. The transformation in the grazing value of grass land as a result of the use of these implements has to be seen to be realized. The experience that has accumulated in recent years indicates very clearly that expenditure on manures can never be profitably undertaken until the mat has been broken up. On occasion it is desirable to adopt the most drastic of all treatments, viz., the ploughing up of the matted turf, the application

of lime and artificial fertilizers, and reseedling with a suitable seeds mixture. Many instances of this treatment have occurred in Derbyshire.

Exception is sometimes taken to the severe cutting-up of the grass land when drastic harrowing is practised. Recovery is, however, particularly rapid, though until grass growth normally takes place in spring treated fields are practically worthless for winter grazing. In very bad cases, it is sometimes necessary to use an implement like the Wilder pitch pole harrows over a succession of years. This implement is fitted with two types of tines, viz., knives and chisel teeth, either of which can be used according to the severity of the work. The chisel teeth tend to rip off large chunks of the matted turf where such exists, and it is sometimes better to collect this turf and cart it off, if labour conditions permit.

There is nothing particularly new in this type of grass land management. In "The Farmer's Kalendar," published in 1771, reference is made to the scarifying of grass land. Thus "scarifying grass is a new practice of some ingenious gentlemen, but not yet become common husbandry. It consists in cutting the turf with a plough of nothing but coulter, or with a ploughing harrow; so that the surface may all be cut or torn If there is any fault in the nature of turf, which prevents the ground yielding crops proportioned to its fertility, it is the surface being so bound by the net-work of roots, which are matted through it, to the exclusion almost of the influences of the atmosphere. Now rolling increases this evil; the more you compress the soil, the less pasture will the roots have: but scarify it, tear it well in pieces, you in fact horse-hoe your grass, and give the roots loose earth to shoot into; but, if your design is to manure, this argument is yet stronger."

Where sound grass land exists, and where an early bite of grass proves of value, applications of nitrogenous manures can be made from the end of the month onwards. Sufficient experience has been gained in recent years to demonstrate that nitrogen, when appropriately used, serves a valuable purpose in lengthening the grazing season. Discretion must be exercised as to the fields that are most suitable for this treatment. In general one should avoid the early bite dressings on fields that because of their dampness tend to tread up badly before the commencement of the ordinary grazing season.

JANUARY ON THE FARM

Wheat.—There can be few excuses for late sowings of wheat this season, but in some instances sugar-beet was not cleared from the ground until well in December, and as wheat is usually the most suitable cereal to follow beet, a certain amount of late winter seeding is bound to occur. It can be accepted without much qualification that, from the standpoint of grain yield, sowings made this month or in February are rarely as successful as earlier sowings. It is possible, however, to obtain quite satisfactory yields from January and February seedings, on light to medium land that is in good heart, especially with a variety such as Little Joss.

As to wheat sown at the normal time, this is a good month in which to form some opinion on the health of the crop. The weather naturally controls the appearance, but the majority of crops have made rapid progress on account of the favourable growth factors that operated until well into December. The chief danger with many crops is that of becoming winter-proud, a condition that obtains when profuse growth and tillering take place very early in the season. Crops that are characterized by this condition at this stage often fail to give satisfactory results at harvest. A winter-proud crop is sometimes controlled by running a flock of sheep over it so that they may remove the premature growth, but such grazing must be kept within reasonable bounds. Too severe a pruning affects the crop adversely, while it is also considered desirable not to graze after the middle of March. It is highly probable that part of the benefit derived from running sheep over wheat results from the treading that the ground receives. Nothing is more fatal to good results with wheat than a loose soil, and particularly at this time of year.

Sugar-Beet Prospects.—Growers of sugar-beet have now received the price particulars for the forthcoming season, and are asked to make contracts on the new terms, which in effect mean a reduction in the price paid for beet. Most agriculturists have acquired sufficient experience with this crop to know how far the proposed prices allow for an adequate margin of profit. The agricultural returns have indicated that on suitable farms sugar-beet has largely replaced other roots. Equally significant is the fact that sugar-beet, by providing residues in the form of tops and crowns and beet pulp for feeding to stock, has enabled

arable farmers to safeguard fertility while providing them with an additional cash crop. At the Norfolk Agricultural Station, Rayns has accumulated evidence concerning this crop on a typically arable soil, and has found it profitable to replace the whole of the mangold and swede crop. Full use has been made of the tops and crowns, with the result that the tops from a ten-tons-per-acre crop provide sufficient food, in association with concentrates, to feed a bullock, while a further $\frac{1}{2}$ ton of dried beet pulp for every acre grown makes it possible to feed $1\frac{1}{2}$ beasts to the acre of beet. These are facts that have to be carefully weighed before a decision is made concerning the coming season's cropping areas. It is most necessary to recognize that the full benefit of beet cultivation is only realized when the by-products of the crop are utilized completely.

The extent to which it is desirable to grow beet on mixed farms engaged in forms of live-stock production other than fattening, depends largely on local circumstances. On dairy farms, the use of beet tops is likely to produce fishy taints in the milk, and there have been many complaints to this effect this season. It will therefore be necessary to reserve these for young stock and cows that are not in milk. Under such conditions it may be necessary to recognize the limitations and the drawbacks of the beet crop, and to consider the merits of alternative cropping. Where farms are in good heart—which is generally true of intensively farmed mixed holdings—the arable land is frequently expected to yield the maximum of food for stock purposes. This presents a new aspect, since beet growing may, in such circumstances, reduce the availability of home-grown food, even allowing for the full use of residues and by-products. Thus, on the Midland College Farm, the writer has found it necessary to buy in beet-pulp over and above the normal grower's allowance to equalize the food requirements on the farm. The following table is an estimate of the net costs of food production on the College Farm, based on 1932-33 figures, and throws some light on the problems involved:—

<i>Average crop per acre.</i>	<i>Dry Matter. Cwt.</i>	<i>Starch Equivalent. Cwt.</i>	<i>Protein Equivalent. Cwt.</i>	<i>Net cost of food per acre, including handling of crop. £13—(having made allowance for the sale of 10 tons of washed beet).</i>
7 tons beet tops ...	22½	12½	1½	
3 tons dried beet pulp	54	39	3	
(purchased)	76½	51½	4½	

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25 tons marrow-					
stem kale ...	70	45	6½	...	£11
28 tons mangolds...	72	39	2¼	...	£13

The high food value of kale is particularly emphasized by comparison with mangolds, but it should be observed that mangolds from the clamp are a safer food than kale during a period of hard frost.

Live Stock.—January is often a troublesome month for live stock. Cattle feeders note a tendency for cattle to make slower progress if fattening, while it is equally necessary to keep an eye on the dairy herd. Changes of succulent food are often responsible for some of the setbacks that are commonly experienced at this time. This is yet a further illustration of the need for gradual changes in the management of stock. Too often the changes are sudden, and trouble is therefore a natural consequence. At this period of the winter cows in stalls frequently begin to show evidence of damaged hocks. This is often one of the unfortunate effects of many modern sheds. Straw, too, is not always available in the quantity formerly used, so that the risk of damage is greater. Breeding pigs, too, are not without their troubles, for this is a difficult month if a cold spell arrives. Warmth is essential in the early stages of a young litter, or heavy mortality may occur. It is sometimes suggested that the Swedish type of house with its provision for winter warmth is not so essential under average English conditions on account of the climatic differences between the two countries. In recent years, however, there have been numerous examples of the need for improvement in English buildings utilized for pigs during the winter. Anæmia in young pigs is often a common cause of mortality this month, but can be avoided by the provision of fresh soil or turf, or by direct dosing with an iron-containing tonic.

NOTES ON MANURING

J. HUNTER SMITH, B.Sc., H. W. GARDNER, B.A., and
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The Use of Nitrogenous Mixtures on Grass Land.—Up to about ten years ago the application of nitrogen to grass land was limited to that intended for hay, and very few advisers would have risked recommending its use on grazing land. About 1925 the war-time experiments of Dr. Warmbold, at Hohenheim in Germany, began to arouse interest in this country,* and shortly afterwards a big drive commenced to popularize the use of nitrogen on pasture under what was termed the “new” or “rotational” system of grass-land management. At first this system was put into operation at only two or three centres, but later was greatly extended; experience, mainly of an observational kind, has now been gained over a period of about seven years, under widely differing conditions.

The former teaching that rapidly-acting nitrogenous fertilizers should not be applied to pasture was backed up by at least three assertions.

- (a) The excreta of the grazing animals, being rich in readily decomposable nitrogenous compounds, were sufficient to supply the grass with what it needed.
- (b) Additional nitrogen might lead to rank growth and therefore less valuable herbage.
- (c) The suppression of clovers by nitrogen, as so clearly demonstrated on the Park Grass at Rothamsted, was likely to lower very considerably the feeding value of the pasture, since clovers are so much richer in protein than grasses.

Probably the most valuable result of the advocacy of the “New System” was the challenge it threw out to these old ideas and the impetus it gave towards fresh lines of investigation. The agricultural scientist had already† been forced to admit that he knew very little about pasture, its chemical composition, its digestibility, etc.—a realization of ignorance that led to the systematic determination of the protein and starch equivalents of pasture of various ages at Cambridge and elsewhere. Concurrently there have been the investigations on the mineral content of grass for which Aberdeen has been responsible, and the extensive study of

* See, e.g., this JOURNAL, Vol. XXXIII, September, 1926, p. 498.

† *Ibid.*, p. 551.

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herbage plants and pasture communities with Aberystwyth as the centre. While all these have been going on, the actual application of the rotational system, whether experimentally or commercially, has elucidated many of the practical problems of handling and catering for stock. Also, arising from the foregoing, there has been the intensive study of these practical points at Jealotts Hill and other places, and this, in turn, has suggested researches on such matters as the effect of manures on vitamin content, feeding value of dried young grass, and so on.

Reviewing the available results that bear on the assertions (a), (b) and (c) above, it can be said that, as a general rule, the excreta of grazing animals are *not* sufficient to ensure maximum growth of the grass. This is particularly true in the early spring, but *may* also be true in the late summer, when it might have been expected that the accumulation of droppings would have provided an ample supply of nitrogen.

The control of rank growth has been shown to be a question of management only: by adequate stocking (and the use of the mowing machine) the farmer can control any extra growth induced by nitrogen.

The suppression of clovers has still not been sufficiently investigated: several factors are involved, including competition with grasses by overshadowing as well as for food, direct injury if nitrogen is used in the form of ammonium salts, and the time of taking the first bite. In consequence, in some years the frequent use of sulphate of ammonia may cause a very severe depression of wild white clover, in other years a comparatively slight one, the reason for the difference not being clear.

On the general side it may be asserted that the "Rotational System" is, next to tethering, the most physically efficient method yet devised. In other words, the principle of keeping the enclosures down to the smallest size consonant with the circumstances is entirely sound. On the other hand, as soon as it becomes necessary to decide whether or not to recommend it in any particular instance, other considerations must be taken into account, and these have dominated the situation so effectively that the intensive system is not yet much practised. Grass land is too cheap and the money returns from stock grazing too low to give the necessary impetus. Where pasture is scarce or when the economic aspects of stock grazing improve, the

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line of development should be, first, the provision of additional stock to ensure more thorough control of the available grass, and at the same time the use of phosphates and potash, and perhaps lime: these measures should produce a substantial rise in productivity. Thereafter, the erection of extra fences, the laying on of water, and the use of nitrogen may be expected to produce a further, though possibly smaller, return. This may be illustrated by the following approximate summary of progress on a large area of grass at "Oaklands" since the Institute was established in 1920:—

<i>Under Extensive Grazing, 1920/26.</i>		
	<i>Carrying capacity of</i>	<i>Ratio.</i>
Neglected Grass in 1921	45 acres.	
Grass after improvement by mixed grazing, severe harrowing, and application of phosphates and potash salts	15 cows	50
	30 "	100
<i>Under Intensive Rotational Grazing (nine five-acre plots), 1927/30.</i>		
Without Sulphate of Ammonia ..	36 cows	120
With Sulphate of Ammonia (3 cwt. per acre per year) ..	45 "	150

Accordingly, if the complete system of rotational grazing combined with nitrogenous manuring be imposed on a piece of poor, badly managed grass, the possibilities of improvement are extremely great, but a good deal of this improvement can be obtained without incurring the heavy financial outlay involved in the full system.

Early Bite.—For many graziers, this season, winter feeding commenced in the middle of the past summer, so that they will be anxious to put into practice any reasonable means of shortening the winter by the provision of "early bite." This is another of the aspects of grass land management that has been brought into prominence largely by the advocacy of the rotational system, though it is not necessarily bound up with that.

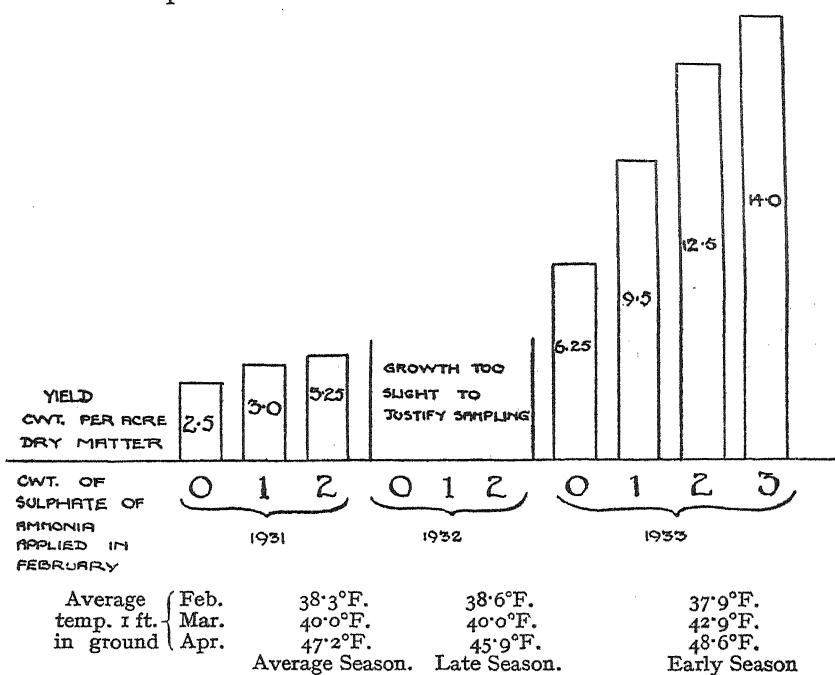
Where arable grass is grown and the soil will stand stocking early in the year, there can be little doubt that the most important step to ensure early keep is to include a suitable species in the mixture, the best being Italian rye grass. Other factors that influence earliness are temperature, food supply, and treatment in the previous season. Similarly, with permanent grass, these influences decide the early spring growth. The earliest species here is perennial rye grass, and, by giving it a chance of recuperation in the

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previous autumn, its growth is favoured in the subsequent year.

Temperature is largely beyond the farmers' control, though it is generally higher where drainage is good, and a choice of field for early grass is often possible.

As far as plant food is concerned, available nitrogen plays a dominant part. Given a suitable temperature and other favourable conditions, sulphate of ammonia or other nitrogenous fertilizers may make a striking difference to the rate of growth in April and May. This is very well illustrated by the following records obtained on permanent grass, situated on a heavy loam, with perennial rye grass as the dominant species.



The results illustrate the limitations as well as the possibilities of the encouragement of "early bite" by sulphate of ammonia (the figures are for dry matter and if multiplied by four will give roughly the weight of fresh grass per acre).

The critical soil temperature for rapid growth of early grasses above ground is believed to be round about 42° F., so that, if the March temperature is well below this, the April bite might be expected to be small even if the ground warms up fairly rapidly in that month. This was true for

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1931 (an average season) when there was a small though useful growth of grass. In 1932 the March soil temperature was about normal, but the April temperature was 1.5 degrees *below* the ten years' average. The result was too little grass to justify sampling—nitrogen making no appreciable difference. In 1933 both March and April temperatures were well above normal, the effect being a plentiful growth of grass *and a great acceleration of this growth* by sulphate of ammonia.

A few further details of the 1933 results are of interest, as they have a bearing on the amount of nitrogen to apply.

Sulphate of Ammonia applied in

February (cwt. per acre)	0	1	2	3
Yield of Fresh Grass, cwt. per acre	21.5	35.5	48.5	59.0
Yield of Dry Matter, " "	6.25	9.5	12.5	14.0
% Crude Protein in dry matter ..	16.5	16.2	17.0	18.0
% recovery of N. applied	—	38.4	42.0	40.7

The efficiency of recovery of the applied nitrogen is maintained at the 3 cwt. level, the percentage of protein is appreciably raised, and the weight of fresh herbage is three times that on the no nitrogen plot. The conclusion seems justified that if nitrogen is used to help on the "early bite" a heavy dressing should be used on a small area of grass rather than a lighter one on a larger area.

Soil Temperature and Horticultural Crops.—The importance of soil temperature in relation to the growth of crops, both under glass and outside, has long been recognized, but, apart from hot beds, very little has been done to increase or control temperature. Some ten years ago experiments were carried out in Norway on the heating of soil by electricity, and experimental work has continued in Scandinavia, at the Cheshunt Research Station, and elsewhere. Except for propagating cases and small frames, the heating of soil by electricity appears to be too costly at present for large commercial undertakings. The new type of insulated soil cables may, however, be a useful alternative to the use of stable manure in hot beds.

For large-scale work, hot-water pipes have been tried. The pipes may be placed under the frames in gutters containing water, or they may be in an air chamber, or be laid directly in the soil. The first method has the advantage of providing the even distribution of moist heat which is so difficult to obtain, apart from the use of a well-made hot bed. The third method has been tried at "Oaklands"

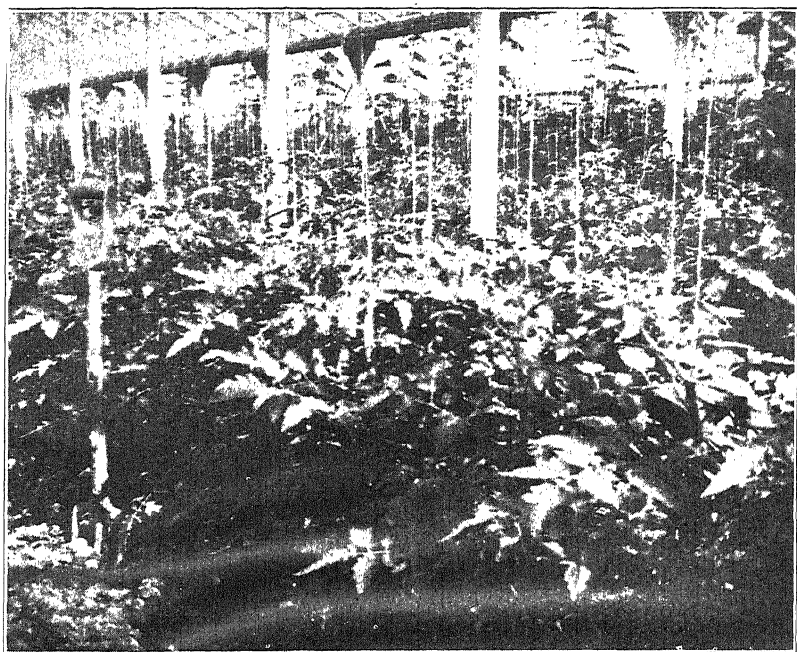
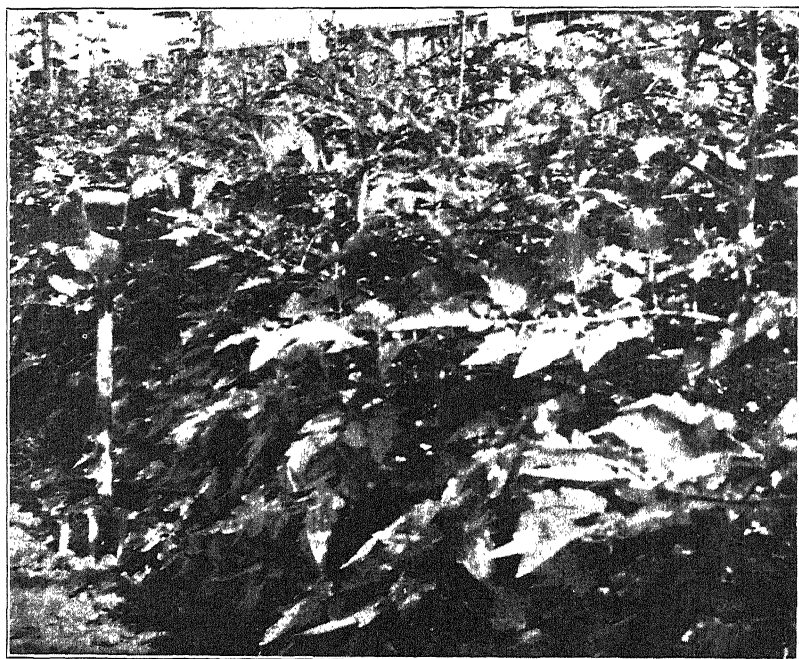


FIG. 1.—In an unheated house.



[Photos: H. W. Gardner.

FIG. 2.—In a heated house.

Showing effect of soil heating in glasshouses at the Herts. Institute of Agriculture, Oaklands, St. Albans. From photographs taken the same day in April, 1933. The fork (on the left) was at the same distance from the

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by the use of one-inch hot-water pipes buried one foot in the ground. The method adopted involved comparatively little capital expenditure and gave very encouraging results last year. The soil temperature was raised on an average 10° F. above that of a house which, apart from the soil pipes, was identical in shape, size and treatment. The tomatoes from the soil-heated house realized £132 in April and May, those from the control house only £81. For the whole season, the soil-heated house gave 1 ton more fruit than the control, an advance representing 8 tons per acre. Owing to cost and other difficulties, a trial of this kind does not lend itself readily to randomized replication, so that the precise degree of reliability to be attached to the figures given cannot be estimated. Further, it is necessary for the method to be tested over several seasons before definite conclusions may be drawn. For example, the quality of the early fruit in the heated house appeared to be below that of the unheated house, a defect which, if confirmed in subsequent years, will obviously have to be put on the debit side. (See accompanying photos.)

With regard to hot beds, these are usually made about the middle of January. Preparations should commence in the summer by making stacks of long fresh horse manure. Each stack should be from ten to fifteen feet wide and ridged like a hay stack, to keep it as dry as possible. About a fortnight before the beds have to be made a further supply of fresh manure should be obtained and stacked. The old and the new manure should then be mixed in equal proportions. The hot bed, after being levelled and trodden down firmly, should have a depth of at least eight inches. The frames should then be placed on the top and filled with nine inches of soil or old hot-bed manure.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended December 6				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 8. 7 13d	£ 8. 7 13d	£ 8. 7 13d	£ 8. 7 13d	s. d. 9 10
„ „ Granulated (N. 16%) ..	7 13d	7 13d	7 13d	7 13d	9 7
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20·6%) ..	7 0d	7 0d	7 0d	7 0d	6 10
Calcium cyanamide (N. 20·6%)	7 2e	7 2e	7 2e	7 2e	6 11
Kainit (Pot. 14%) ..	3 6	3 0	2 17	3 0g	4 3
Potash salts (Pot. 30%) ..	5 4	5 1	4 17	4 19g	3 4
„ „ (Pot. 20%) ..	3 15	3 9	3 6	3 10g	3 6
Muriate of potash (Pot. 50%)	9 8	9 1	8 15	9 1g	3 7
Sulphate „ „ (Pot. 48%)	10 12	10 7	10 0	10 6g	4 3
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%)	3 2	..	3 4	2 16k	3 6
„ „ (S.P.A. 13½%)	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	7 15	6 15	6 10f	6 7	..
Steamed bone-flour (N. ¾%, P.A. 27½-29½%) ..	5 5	5 12	5 5f	5 7	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

o Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. > 1 not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
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"Weatings": A Stabilized Wheat-feed.—In future home-manufactured fine wheat-feed, the product of British mills, is to be sold under the trade mark names of "Weatings" and "Superfine Weatings" carrying a guarantee of not more than 5.75 per cent. and 4.5 per cent. of fibre respectively. It is stated by the Millers' Mutual Association that these percentages represent a maximum, and that actually the fibre content of the products will generally be lower than the guarantee. "Weatings" and "Superfine Weatings" will have respective starch equivalents of 62 to 64 per cent. and 68 per cent. These figures represent a higher starch equivalent for weatings than has usually been attributed to sharps in most analytical tables.

This development should be of definite value, particularly to pig and poultry keepers, in ensuring standardized products with standardized names. Wheat offals or wheat feeds have long been at a disadvantage as regards their names. The term "offal" has suggested some by-product of a second-rate quality, while other names for the same product were numerous, diverse and confusing. Sharps and middlings were possibly the commonest and best-known descriptive terms, and to those unfamiliar with the term "wheat-feed" it may be necessary to explain that "weatings" replaces the term "sharps," and "superfine weatings" that of "fine middlings." Purchasers should look out for the appropriate trade marks. It is possible that in view of the alteration in the standard of weatings or sharps, some adjustment may be desirable in certain of those rations that are looked upon as more or less standard ones in the feeding of pigs and poultry.

Rations for Milk Production: Sows and Ewes.—In a popular book on agriculture, recently revised, the following ration is recommended for sows and weaners:—55 parts barley meal, 33 parts middlings, 12 parts fish meal. In two particulars, this ration is open to criticism. It is widely

NOTES ON FEEDING

recognized, not only in this country but abroad, that it is necessary to limit the amount of barley meal in the ration of female stock in-milk. The testimony is fairly clear that a high percentage of barley has a depressing effect upon milk yield; while with weaners, excess of barley has given rise to digestive troubles and general unthriftiness. In consequence we recommend that a lower percentage of barley than that quoted should be used for sows and weaners. Further, fish meal is expensive, and it has not been proved that proportionate advantages arise from the inclusion of more than 10 per cent. in a ration. To raise the proportion to 12 per cent. simply increases the cost without corresponding benefit. Safer rations, which in practice give satisfactory results, are on the lines of the following: barley meal, 35 per cent.; "weatings," 55 per cent.; fish meal, 10 per cent. Alternatively: barley meal, 35 per cent.; "superfine weatings," 45 per cent.; bran, 10 per cent.; and fish meal, 10 per cent.

In the same book, a ration recommended for ewes in milk consists of equal parts of barley and decorticated ground nut cake. Even if the ewes consume this mixture in its correct proportions it is open to criticism on account of the high proportion of barley; but what is apt to happen is that the stronger ewes, preferring the ground nut cake to the barley, keep the weaker ewes away from the trough until they have consumed the cake, leaving the barley to the weaker ones. The result is that the stronger ewes get an unbalanced and dangerous ration, much too high in protein, while the weaker receive a food which neither provides sufficient protein nor stimulates milk production. As an alternative ration the same writer recommended a mixture consisting of decorticated cotton seed meal, 1 part, and crushed oats, 2 parts. This is a better mixture, both because the protein-rich food is in meal form and can be more thoroughly mixed with the oats, and because the crushed oats are in themselves better suited for the purpose than crushed barley. This mixture, given at the rate of $\frac{1}{2}$ to 1 lb. per ewe per day, should answer reasonably well in the feeding of a ewe flock folded on kale and given a controlled allowance of hay.

Feeding and Quality of Bacon Carcass.—Some disappointment has been caused recently because substantial deductions have been made from the price paid for bacon

NOTES ON FEEDING

pigs on account of soft carcasses. Soft, oily bacon has given bacon factories cause for complaint from time to time for some years, and work on the cause and prevention of oily bacon has been carried out at the Brierley Hill Factory, from which farmers interested can obtain the available information on application.

Softness of carcass is attributed mainly to faulty feeding; but it should not be overlooked that carcass quality is also a matter of breeding. Rations containing a high percentage of oil are suspect, and the degree of softness of fat appears to depend upon both the nature and amount of the oil present in the food. In assessing the probable effect of rations, it is pointed out that it is necessary to consider the total oil content in relation to the total digestible matter. It is stated that safety can be ensured by restricting the oil percentage of the ration to not more than 3 per cent., but in practice it may be found a little difficult to make up satisfactory rations at reasonable cost without exceeding this figure. Some of the foods regarded as specially safe in this connexion are blood meal, extracted soya bean and palm kernel meals, peas, beans, barley meal, tapioca meal, flaked maize, and also separated milk and whey. Risky feeding stuffs in common use and possessing rather a dangerous oil content are low-grade fish and meat meals, linseed, linseed cake, coconut cake, maize germ meal, rice meal, wet and dried grains. A high percentage of one of these foods, or a combination of more than one in such quantity as to constitute a substantial portion of the ration, should be avoided, in order to guard against the possibility of producing a soft and inferior carcass. In the bacon factory list "weatings" come in a class between the specially safe and the "risky" foods, but we know from experience that first-class carcasses have been produced when "weatings" have formed 45 per cent. of the ration, and it would appear that this food is safer than the Brierley Hill reports seem to indicate.

As far as management is concerned, it is generally regarded as of importance that growth and development should proceed steadily and without interruption, although apparently growth should not necessarily be at the optimum rate. Experiments conducted in the United States where pigs were fed at three different levels—the usual full allowance of food, three-quarters, and one-half of the full allowance—showed that the average amount of fat in the

NOTES ON FEEDING

carcasses of the pigs fed at the three rates was 35·7 per cent., 34·3 per cent., and 28·7 per cent. respectively. On the other hand, it is a little disconcerting to find that the group on half rations showed decreased firmness of the carcass and softer fat.

Increasing stress is being placed on the quality of meat products for human consumption, and although we must continue to bear in mind that carcass conformation is largely hereditary, there is work to be done in determining the most suitable conditions of feeding and management to secure the highest standard of carcass development. A good deal of information is already available, mainly with regard to the methods practised by those who have been consistently successful in practical production. There is, however, some contradictory evidence, and there is no doubt that much advance is likely to be made in the immediate future in determining the technique for quality production. Judged by the interest to which recent carcass competitions have given rise, it is evidently a matter about which the more progressive breeders and feeders desire to be informed.

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	5 0	0 8	4 12	72	1 3	0.67	9.6
Barley, British feeding	5 15	0 8	5 7	71	1 6	0.80	6.2
" Argentine	4 12½	0 8	4 4	71	1 2	0.62	6.2
" Danubian	4 12	0 8	4 4	71	1 2	0.62	6.2
" Persian	4 10*	0 8	4 2	71	1 2	0.62	6.2
" Russian	4 12	0 8	4 4	71	1 2	0.62	6.2
Oats, English white	5 13	0 8	5 5	60	1 9	0.94	7.6
" black and grey	5 13	0 8	5 5	60	1 9	0.94	7.6
" Scotch white	6 10	0 8	6 2	60	2 0	1.07	7.6
" Canadian No. 2 Western	6 5	0 8	5 17	60	1 11	1.03	7.6
" No. 3	5 17	0 8	5 9	60	1 10	0.98	7.6
" mixed feed	4 13	0 8	4 5	60	1 5	0.76	7.6
" Argentine	5 12	0 8	5 4	60	1 9	0.94	7.6
" Russian	5 12	0 8	5 4	60	1 9	0.94	7.6
Maize, Argentine	4 17	0 6	4 11	78	1 2	0.62	7.6
Beans, English Winter	5 10½	0 16	4 14	66	1 5	0.76	19.7
Peas, English, blue	12 5½	0 14	11 11	69	3 4	1.78	18.1
" Japanese	19 7½	0 14	18 13	69	5 5	2.90	18.1
Dari	6 15†	0 7	6 8	74	1 9	0.94	7.2
Milling offals—Bran, British	5 12	0 15	4 17	43	2 3	1.20	9.9
" broad	6 0	0 15	5 5	43	2 5	1.29	10
Middlings, fine imported	5 10	0 12	4 18	69	1 5	0.76	12.1
" coarse British	5 12	0 13	4 19	56	1 9	0.94	10.7
Pollards, imported	5 0	0 13	4 7	62	1 5	0.76	11
Meal, barley	6 5	0 8	5 17	71	1 8	0.89	6.2
" grade II	5 10	0 8	5 2	71	1 5	0.76	6.2
" maize	5 10	0 6	5 4	78	1 4	0.71	7.6
" germ	5 10	0 10	5 0	79	1 3	0.67	8.5
" locust bean	7 0	0 5	6 15	71	1 11	1.03	3.6
" bean	8 0	0 16	7 4	66	2 2	1.16	19.7
" fish	15 0	1 18	13 2	59	4 5	2.37	53
Maize, cooked flaked	6 0	0 6	5 14	84	1 4	0.71	9.2
" gluten feed	5 17	0 12	5 5	76	1 5	0.76	19.2
Linseed cake, English, 12% oil	9 5	0 19	8 6	74	2 3	1.20	24.6
" " " 9% "	8 17	0 19	7 18	74	2 2	1.16	24.6
" " " 8% "	8 12	0 19	7 13	74	2 1	1.12	24.6
" " " 6% "	8 17½	0 19	7 18	74	2 2	1.16	24.6
Soya-bean cake, 5½% oil	7 7½	1 6	6 1	69	1 9	0.94	36.9
Cottonseed cake—English, Egyp- tian seed, 4½% oil	4 7	0 17	3 10	42	1 8	0.89	17.3
" " English, Indian seed, 4% oil	4 7½	0 17	3 10	42	1 8	0.89	17.3
" " Egyptian, 4½% oil	4 0	0 17	3 3	42	1 6	0.80	17.3
" " decorticated, 8% "	6 15†	1 6	5 9	68	1 7	0.85	34.7
" meal, decorticated, 8% "	6 15†	1 6	5 9	68	1 7	0.85	34.7
Coconut cake, 6% oil	6 0†	0 17	5 3	77	1 4	0.71	16.4
Ground-nut cake, 6-7% oil	5 17½	0 17	5 0	57	1 9	0.94	27.3
" " decor., 6-7% oil	7 0	1 6	5 14	73	1 7	0.85	41.3
" " decorticated, imported, 6-7% oil	6 2	1 6	4 16	73	1 4	0.71	41.3
Palm-kernel cake, 4½-5½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 4½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 1-2% oil	5 5	0 11	4 14	71	1 4	0.71	16.5
Feeding treacle	5 0	0 8	4 12	51	1 10	0.98	2.7
Brewers' grains, dried ale	5 2	0 10	4 12	48	1 11	1.03	12.5
" " " porter	4 15	0 10	4 5	48	1 9	0.94	12.5

*At Bristol. § At Hull. † At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of November, 1933, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5½. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.29d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N 20.0, P 10.0, K 10.0, S 10.0, A 10.0, M 10.0, L 10.0, F 10.0, C 10.0, H 10.0, G 10.0, B 10.0, J 10.0, I 10.0, O 10.0, X 10.0, Y 10.0, Z 10.0.

FARM VALUES OF FEEDING STUFFS

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	4 11
Maize	78	7.6	4 17
Decorticated ground-nut cake ..	73	41.3	7 0
„ cotton cake ..	68	34.7	6 15

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.25 shillings, and per unit protein equivalent, 1.56 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1933, issue of the Ministry's JOURNAL, p. 784.)

FARM VALUES.

Crop	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9.6	5 5
Oats	60	7.6	4 7
Barley	71	6.2	4 18
Potatoes	18	0.8	1 4
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 9
Beans	66	19.7	5 13
Good meadow hay	37	4.6	2 13
Good oat straw	20	0.9	1 6
Good clover hay	38	7.0	2 18
Vetch and oat silage	13	1.6	0 19
Barley straw	23	0.7	1 10
Wheat straw	13	0.1	0 16
Bean straw	23	1.7	1 11

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE November index of the prices of agricultural produce at 109 was two points higher on the month and was 8 points above the figure recorded a year ago. The increases in the prices of fat sheep, fat pigs, potatoes and hay were mainly responsible for the advance in the index as compared with October.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	102
June	153	140	131	123	111	100
July	145	141	134	121	106	101
August	144	152	135	121	105	105
September	144	152	142	120	104	107
October	139	142	129	113	100	107
November	141	144	129	112	101	109
December	140	143	126	117	103	—

Grain.—Wheat at 4s. 7d. per cwt. was 3d. cheaper than a month earlier and oats at 5s. 4d. were reduced by 1d. per cwt., while the relative index numbers declined 4 and 2 points respectively to 61 and 76. Barley at 9s. 4d. per cwt. cheapened by as much as 10d. and a reduction of 10 points in the index to 110 was recorded. A year ago the index numbers for wheat, barley and oats were 72, 86 and 85 respectively.

Live Stock.—There was very little alteration in the prices of fat cattle during November although the index appreciated one point to 100. A further advance occurred in the values of fat sheep, the index being 110 as compared with 107 in October, while both bacon and pork pigs also sold at higher rates, the former being dearer by 6d. and the latter by 11d. per score; the relative indices rose by 7 and 8 points respectively to 104 and 118. Dairy cows and store cattle were cheaper, the former averaging 7 per cent. more and the latter 15 per cent. less than in the base period, but quotations for store sheep and pigs advanced, the index

MISCELLANEOUS NOTES

for the former being 4 points and for the latter 5 points higher on the month.

Dairy and Poultry Produce—The index of the contract prices of milk was 161 as compared with 157 and 152 a month and a year earlier. Butter was unaltered in price but as a slight rise occurred in November, 1911-13, the index was 3 points lower on the month. Cheese, however, appreciated slightly both as regards price and index. Eggs became dearer by about 4d. per dozen during the month under review but as this increase was not proportionate to that which occurred in the base period, the index fell by 4 points to 108.

Other Commodities.—An increase of 2s. 6d. per ton in the average price for potatoes caused the index to rise by 5 points to 15 per cent. above pre-war. Both clover and meadow hay were somewhat dearer, the combined index being 78 as compared with 74 in October. Wool continued to move upwards and was 2 points higher at 81. Most classes of vegetables were cheaper than in October and the combined index fell 5 points to 138.

Monthly index number of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	Nov.	Nov.	Aug.	Sept.	Oct.	Nov.
Wheat	90	72	72	63	65	61
Barley	106	86	125	129	120	110
Oats	98	85	79	78	78	76
Fat cattle...	115	101	100	99	99	100
„ sheep...	113	87	103	100	107	110
Bacon pigs	88	85	95	101	97	104
Pork „	102	92	96	106	110	118
Dairy cows	123	117	104	110	114	107
Store cattle	118	97	98	94	89	85
„ sheep	112	70	83	83	86	90
„ pigs	129	95	115	132	139	144
Eggs	123	112	117	115	112	108
Poultry	127	121	120	121	122	120
Milk	121	152	150	160	157	161
Butter	105	97	92	98	98	95
Cheese	106	115	115	110	103	105
Potatoes	231	123	91	99	110	115
Hay	78	67	71	73	74	78
Wool	79	62	72	76	79	81

MISCELLANEOUS NOTES

Export of Breeding Stock

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during the three months ended September, 1933, compared with the corresponding period of 1932. (From returns supplied by H.M. Customs and Excise.)

	1933		1932	
	Number	Declared value	Number	Declared value
CATTLE		£		£
Argentina	7	675	3	1,400
Brazil	11	340	0	0
Iceland	5	151	0	0
Russia	0	0	238	9,054
Uruguay	0	0	1	400
Canada	3	255	7	400
Irish Free State	107	1,075	5	73
Kenya	4	194	10	648
Southern Rhodesia	3	167	0	0
Union of South Africa	3	70	12	1,090
Other countries	2	55	8	308
Total	145	2,982	284	13,373
SHEEP AND LAMBS				
Belgium	7	11	5	31
Chile	20	700	0	0
Iceland	0	0	25	250
Norway	0	0	27	118
Paraguay	0	0	31	465
Spain	26	265	0	0
Australia	7	421	4	150
Falkland Islands	22	333	0	0
Irish Free State	75	567	0	0
Other countries	43	552	13	195
Total	200	2,849	105	1,209
SWINE				
Argentina	20	150	0	0
Brazil	2	29	3	55
France	8	103	0	0
Japan	30	160	0	0
Netherlands	9	75	0	0
Poland	3	55	11	105
Channel Islands	38	82	0	0
Irish Free State	30	110	0	0
Jamaica and Dependencies	2	31	3	60
Other countries	8	151	2	65
Total	150	946	19	285

MISCELLANEOUS NOTES

International Poultry Exhibition, Paris, 1934.—The Sixty-eighth International Exhibition organized by the Société Centrale d'Aviculture de France will take place in Paris from February 15 to 26 next. Classes for live and dressed poultry, ducks, geese, turkeys, pigeons, and rabbits for fur and flesh, will be represented, as well as a large variety of appliances for breeding and rearing. The prizes will include a cup presented by the President of the Republic, and medals will be awarded by the Minister of Commerce and by the more important agricultural associations. A programme containing full particulars of the exhibition, conditions of entry, etc., may be obtained on application to the Secretary, Société Centrale d'Aviculture de France, 34 rue de Lille, Paris (VIIe).

Foot- and - Mouth Disease.—No outbreak of foot-and-mouth disease has occurred in Great Britain since October 31, 1933, and at the time this issue goes to press the whole of Great Britain is free from Foot-and-Mouth Disease (infected area) restrictions.

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on December 12, 1933, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Berkshire.—An Order continuing (with a modification in respect of the week in which Whit Monday falls) the operation of the existing minimum and overtime rates of wages from December 31, 1933 (i.e., the day following that on which the existing rates are due to expire) until December 29, 1934. The minimum rates in the case of male workers of 21 years of age and over are 28s. 6d. per week of 41 hours in the weeks in which Good Friday and Christmas Day fall, 41 hours (instead of 50 as formerly) in the week in which Whit Monday falls and 50 hours in any other week, with overtime throughout the period at 8½d. per hour. For female workers of 19 years of age and over the minimum rate is unchanged at 5d. per hour.

Cornwall and Isles of Scilly.—An Order fixing minimum and overtime rates of wages for male workers and minimum rates of wages for female workers to come into force on December 24, 1933 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until December 22nd, 1934. The minimum rates of wages for male workers of 21 years of age and over are 31s. (instead of 30s. as at present) per week of 33 hours in the week in which Christmas Day and Boxing Day fall, 42 hours in the weeks in which New Year's Day, Good Friday and Whit Monday fall, and 51 hours in any other week. The overtime rates for male workers of 21 years of age and over remain unchanged at 9d. per hour on weekdays and 10d. per hour on Sundays. For female workers of 20 years of age and over the minimum rate is 5d. per hour for all time worked.

Derbyshire.—An Order continuing the operation of the existing minimum and overtime rates of wages from December 26, 1933 (i.e., the day following that on which the existing rates are due to expire) until December 25, 1934. The minimum rates for male workers of 21 years of age and over are 7½d. per hour for a week of 54 hours with payment for overtime (i.e., employment on Sundays) at 10d. per hour. For female workers of 18 years of age and over the minimum rates are 5d. per hour with payment for overtime (i.e., employment on Sundays) at 8d. per hour.

Hampshire and Isle of Wight.—An Order continuing the operation of the existing minimum and overtime rates of wages for male

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workers and minimum rates of wages for female workers from 31st December, 1933 (i.e., the day following that on which the existing rates are due to expire) until December 29, 1934. The minimum rates for male workers of 21 years of age and over are 29s. 6d. per week of 43½ hours in the week in which Good Friday falls, except in the case of a worker who in lieu of a day's holiday during this week is given a clear day's holiday in the following week, in which case the minimum weekly wage is payable in respect of 53½ hours; 53½ hours in the week in which Easter Monday falls, except in the case of a worker who in lieu of a day's holiday in the previous week is given a clear day's holiday in this week, in which case the minimum weekly wage is payable in respect of 43½ hours; 53½ hours in any other week in summer; 40½ hours in the week in which Christmas Day falls and 48 hours in any other week in winter, with overtime throughout the year at 8d. per hour except in the case of carters, cowmen, shepherds and milkers for work in connexion with the immediate care of animals, in which case the overtime rate is 7½d. per hour. For female workers of 18 years of age and over the minimum rate is 5d. per hour for all time worked.

Norfolk.—An Order continuing the operation of the existing minimum and overtime rates of wages from December 31, 1933 (i.e., the day following that on which the existing rates are due to expire) until March 24, 1934. The minimum rates for male workers of 21 years of age and over are 30s. per week of 48 hours in winter and 50 hours in summer, with in addition in the case of workers employed as teamsmen, cowmen, shepherds or yardmen, 5s. 6d. per week, and in the case of sheep-tenders and bullock-tenders, 4s. 6d. per week in lieu of overtime in respect of work in connexion with animals. The overtime rates in the case of all male workers of 21 years of age and over are 9d. per hour on weekdays and 11d. per hour on Sundays. The minimum rate for female workers of 18 years of age and over is 5d. per hour with overtime at 6½d. per hour on weekdays and 7½d. per hour on Sundays.

Somerset.—An Order continuing the operation of the existing minimum and overtime rates of wages for male workers and minimum rates of wages for female workers from December 24, 1933 (i.e., the day following that on which the existing rates are due to expire), until June 23, 1934. The minimum rates for male workers of 21 years of age and over are 30s. 6d. per week of 32½ hours in the week in which Christmas Day and Boxing Day fall, 50 hours in any other week in winter, 42½ hours in the weeks in which Good Friday, Easter Monday and Whit Monday fall, and 52 hours in any other week in summer, with overtime at 9d. per hour, except for overtime employment on the hay and corn harvests, when the rate is 10d. per hour. For female workers of 21 years of age and over the minimum rate is 6d. per hour for all time worked.

Suffolk.—An Order fixing minimum and overtime rates of wages for male workers to come into force on December 24, 1933 (i.e., the day following that on which the existing rates are due to expire), and to be in operation until December 29, 1934. The minimum rates for male workers of 21 years of age and over are (a) for the period from December 24, 1933, to March 3, 1934, 28s. (as at present) per week of 39½ hours in the week in which Christmas Day (instead of Boxing Day as in 1932) falls, and 48 hours in any other week; (b) for the period from March 4, 1934, to December 29, 1934, 29s. (instead of 28s. as formerly) per week of 41½ hours in the week in which Good Friday falls, 50 hours in any other week in summer, 39½ hours in the week in which Christmas Day falls, and 48 hours in any other week in winter, with, in addition during both periods in the case of horsemen,

MISCELLANEOUS NOTES

cowmen and shepherds of 18 years of age and over, a sum of 6s. per week to cover employment up to 10 hours per week in connexion with the immediate care of animals. The overtime rate for all male workers of 21 years of age and over remains unchanged at 9d. per hour.

Surrey.—An Order continuing (with a modification in respect of the week in which Christmas Day falls) the operation of the existing minimum and overtime rates of wages from December 24, 1933 (i.e., the day following that on which the existing rates are due to expire), until December 22, 1934. The minimum rate for skilled male workers (horsemen, stockmen and shepherds) of 21 years of age and over is 37s. per week of 51 hours in the weeks in which Christmas Day and Good Friday fall and 60 hours in any other week. For other male workers (except casual workers) of 21 years of age and over, the minimum rate is 30s. 9d. per week of 41 hours in the weeks in which Christmas Day and Good Friday fall and 50 hours in any other week. In both cases provision is made for the payment of the minimum rate of wages in respect of the reduced number of hours in Easter week instead of the week in which Good Friday falls, if a holiday is given on Easter Monday in lieu of one on Good Friday. The minimum rate for casual male workers of 21 years of age and over is 7½d. per hour. The overtime rates for all classes of adult male workers are 9d. per hour on weekdays and 11d. per hour on Sundays. For female workers of 18 years of age and over the minimum rate is 5½d. per hour, with overtime at 7d. per hour on weekdays and 8d. per hour on Sundays.

Wiltshire.—An Order continuing from December 31, 1933 (i.e., the day following that on which the existing rates are due to expire), until December 29, 1934, the minimum and overtime rates of wages for male workers and minimum rates of wages for female workers. The minimum rates for male workers of 21 years of age and over are 30s. per week of 41 hours in the weeks in which Good Friday and Christmas Day fall, and 50 hours in any other week, with overtime throughout the period at 8d. per hour, except that for overtime employment on harvest work on the hay and corn harvests the rate shall be not less than 9d. per hour. For female workers of 18 years of age and over the minimum rate is 5d. per hour.

Enforcement of Minimum Rates of Wages.—During the month ending December 14, 1933, legal proceedings were taken against five employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
Bedford and Huntingdon Lincoln Holland Wiltshire ... Yorks, E.R. Pembroke and Cardigan	Huntingdon	£ s. d. 36 0 0*	£ s. d. 4 18 0	£ s. d. 95 0 11	6
	Boston ...	10 0	7 6	10 10 0	1
	Ludgershall	2 0 0	3 0 0	27 0 0	2
	Howden ...	5 0 0	5 0	13 5 4	2
	Cardigan ...	3 0 0	1 5 0	4 0 0	1
		£46 10 0	£9 15 6	£149 16 3	12

* Or one month's imprisonment.

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APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Derbyshire:—Mr. G. L. Maw, B.Sc., has been appointed District Agricultural Organizer, *vice* Mr. R. H. Smith, B.Sc.

Lancashire:—Miss G. V. Moore, N.D.D., has been appointed Assistant Instructor in Dairying, *vice* Miss E. M. Wheeler, B.Sc.

WALES

Caernarvonshire:—Miss M. Jones, N.D.D., has been appointed Dairying Instructor, *vice* Miss M. Roberts, resigned.

Teaching Staffs at University Departments of Agriculture, Agricultural Colleges, etc., in England and Wales

The Midland Agricultural College, Sutton Bonington.

Mr. J. C. Blossom, B.Sc., N.D.A., N.D.D., has been appointed Assistant Lecturer in Agriculture, *vice* Mr. G. L. Maw, B.Sc., who has obtained the appointment in Derbyshire noted above.

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Manuel d'Arboriculture Fruitière (*Manual of Fruit-Growing*). By E. Delplace. Pp. viii + 450: 441 figs. (Paris: J. Lamarre, 4, Rue Antoine-Dubois (Vie). 1933. Price 30 frs. Post free to Britain, 33.50 frs.)

Until recently fruit-growing in France has been carried out by small growers for the supply of local markets, and France has been an importing country for certain kinds of fruit. Commercial fruit-growing is now being developed, although the methods advocated in this book indicate that development is being made along intensive lines rather than towards "mass production." Such methods are doubtless most suited to the fruit cultivator who is more ready to trust to the traditions and accumulated experience of practical growers than to the results of scientific research, to which little reference is made. British readers will find useful the account of the general distribution of fruit production in France, and will be interested in many of the French cultural operations described, particularly those in the section on pears, which is well illustrated with figures of the different types of fruit buds and methods of pruning.

Agricultural Systems of Middle Europe: A Symposium. Edited by O. S. Morgan. Pp. xix. + 405. (London: Macmillan & Co. Ltd. 1933. Price 25s.)

In spite of the friction that still exists between nationalities, a sense of international interdependence is becoming more lively throughout the world, and the production of such books as that recently issued by the Royal Institute of International Affairs on "World Agriculture" is one evidence of this. Further evidence is provided by Professor Morgan's symposium, to which contributions have been made by experts from a number of countries in Europe. Although this work, as its title shows, does not cover such a wide field as "World Agriculture," it nevertheless provides what is perhaps more detailed information regarding the smaller nationalities of Central Europe.

The method by which the information was obtained is a sufficient guarantee of its exhaustive character, and the fact that each of the contributors was asked to formulate his essay along uniform lines means that conditions in each of the individual countries can be com-

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pared, a proceeding that is not always very easy if one has only official reports to depend upon. Although the countries of the region dealt with provide various similar characteristics, such as size of holdings, etc., they stretch from the Mediterranean to the Baltic and include large areas of both mountain and plain, and there are naturally and necessarily divergences in the practices of the different nationalities. The various States nearly all supply their own necessities, at least in the main, but there is both internal trade and mutual trade as well as export to countries outside Central Europe. For instance, Czechoslovakia needs to import only a proportion of its supplies, but must feed the industrialized region from the agricultural district because the two are practically distinct divisions of the country. Besides supplying the subsistence of their own populations, most of the other countries depend upon export business, and various systems of organization have been set up to cope with the problems that modern export trading involves. Such organizations do not, it seems, vary very widely, and the distinctions between them are largely those of nomenclature rather than anything really material.

The information gathered here covers not only the systems of farming and trading, but also the organization set up for agricultural education and research, and the systems of modification of tenure, etc., and rationalization of practice that have either been put into force, as in Roumania, or that it is hoped that it will be possible to enforce, as in Poland.

At a time when every country in the world is suffering from the troubles collectively known as the agricultural crisis, the publication of a volume of information of this kind, bringing together in a small compass a description of the methods being adopted in a number of countries to overcome, or at least to assuage, the difficulties of their farming population, is of great value. Its interest is, of course, primarily for the administrative classes of each nation, but it should also engage the attention of those actually occupied in the industry, inasmuch as it will enable them to formulate a judgment of the various proposals being put forward in their own country towards a solution of their own domestic problems.

The Agricultural Landowner's Handbook. By R. Strachan Gardiner. Introd. by Lord Clinton. 4th ed. Pp. 208. (London: Central Landowners' Association. 1933. Price 5s.)

The present issue of this "guide to law and practice in England and Wales" relating to taxes, rates, tithe rentcharge and death duties is an enlargement of the earlier editions that have proved so useful to landowners and others. It contains revised and fuller information on such questions as the remission of tithe rentcharge, electricity wayleaves, manorial incidents, obsolescence allowance for plant and machinery, exemptions from land tax, rating powers of parish councils and rating of fishing rights. New chapters are also included dealing with "Taxation of Mineral Rights" and "Land Drainage Rates." The new edition, as thus revised and enlarged, should prove invaluable to all persons having an interest in, or dealings with land.

Diseases of Poultry: Their Prevention and Treatment. By H. P. Bayon. Pp. 155 and 36 Figs. (London: "The Feathered World." 1933. Price 3s. 6d.)

Mr. E. T. Halnan, of the School of Agriculture, University of Cambridge, writes a foreword to this publication, recommending it to practical poultry keepers. The book deals with the breeding, rearing, feeding and housing of birds in relation to disease, and also contains notes on the biology of the fowl. Many of the bacterial and virus diseases and parasitic infestations of poultry are discussed, and suggestions are made regarding preventive measures and, where possible, treatment. Chapter XI very briefly deals with the impor-

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tant subject of General Poultry Hygiene. This section could well have been extended with great advantage, but contains some useful practical suggestions of the steps to be taken by the poultry keeper in case of an outbreak of infectious disease in his stock. The work is well prepared, and the publishers are to be congratulated upon their part of the production.

How Plants get their Names. By L. H. Bailey. Pp. vi + 209. Illus. (London: Macmillan & Co. Ltd. 1933. Price 12s.)

The object of this volume is to explain in simple language the system of nomenclature employed by botanists. There is an interesting chapter on Linnaeus and the binomial system, with references to the classificational schemes adopted by certain of his predecessors, notably Tournefort and Clusius. Rules of nomenclature are discussed in some detail, and there are useful pronouncing lists of generic and specific names, the latter including English equivalents. Horticulturists and others will find this a very readable guide to precision in naming the plants that come under their notice.

Investigations on Barley: Report on the Ten Years of Experiments under the Institute of Brewing Research Scheme, 1922-1931. By Sir E. J. Russell, O.B.E., D.Sc., F.R.S., and L. R. Bishop, M.A., Ph.D. Pp. 134. (London: Institute of Brewing. 1933. Price 2s. 6d.)

This report, originally issued as a Supplement to the *Journal of the Institute of Brewing* (Vol. XXXIX, No. 7), presents some concrete results that are likely to be of service to the barley grower and to those who use the grain and its products industrially. The programme of investigations formulated by the supervising Committee fell into three sections:—

- (i) The influence of environmental conditions, soil, season and manuring, on the yield and quality of barley;
- (ii) The possibility of developing new varieties of barley better suited to the maltster, the brewer and the farmer, than are the present sorts; and
- (iii) The relation of chemical composition of barley to malting and brewing value.

Although the three items are necessarily interdependent, and one can hardly be separated from the others, the principal interest of the farming community will be found in the first two, while the brewing industry must necessarily be more preoccupied with the third, which has occupied a steadily increasing proportion of the Committee's time and resources.

Investigations along these lines were not new when the Committee's programme was formulated, and the work done before 1922 was summarized by H. E. Hulton in *The Journal of Brewing* (1922, pp. 33-142). Many developments in science have taken place since the older work was carried out, and biochemistry, physiology and mathematical statistics now provide new methods for attacking the problems involved.

In 1922 the relationship of the nitrogen compounds in the barley grain to the extract of the malt was a matter of controversy; it is now a matter of knowledge. A method has been worked out for predicting the extract in the malt from the nitrogen content of the grain and its 1,000-corn weight. This method has been widely tested in practice and found to hold good. It is now used by several large buyers in the purchase of their barley.

Close connexion has been found to exist between the amounts of the individual proteins and the total nitrogen. It is now shown that the quantities of hordein, glutelin and of the other nitrogen compounds are always closely related to one another and to the total nitrogen. Similar regular relations apparently occur between the

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carbohydrates in the grain. This result is of great scientific value as showing that each variety of barley is built up on a definite pattern, which can be altered by changes in conditions, but only within the limits set up by the pattern, so that the variety always retains its distinctive character. Given a determination of the percentage of nitrogen it is therefore possible to state at once the whole composition of the grain as we know it at present.

Different varieties have different patterns, and the differences are more marked among the six-rowed than among the two-rowed varieties, but in no conditions so far discovered do the patterns merge or lose their distinctiveness. The differences between varieties constantly reappear in all the tests made under normal agricultural conditions, though there are some reversals of effects under conditions of abnormal starvation. The type of pattern can by plant-breeding methods be changed within limits defined by the laws of genetics; within these limits new varieties having different proportions of the various nitrogen compounds and of carbohydrates can be produced. Some of these varieties may be better suited than existing sorts to the special requirements of different groups of maltsters and brewers, but the writers suggest that there seems to be no necessity for a large number of varieties, and it would probably be to the advantage of all concerned if growers, maltsters and brewers could agree to concentrate on a few standard sorts. Plumage-Archer and Spratt-Archer were found to be distinctly superior to others in yield, valuation, low nitrogen content and high extract.

Work upon the changes in nitrogen compounds during malting has shown that for any given variety it is possible from the nitrogen content of the grain to calculate not only the quantities of the various proteins in the barley but also the qualities of the various groups of nitrogen compounds in the malt and in the wort.

The laboratory work has left no doubt as to the prime importance of the nitrogen content of the grain, and field work was therefore directed towards discovering how this is related to soil, season, manuring and other conditions. As a result, the effect of the various conditions on the nitrogen content of barley can now be set out much more clearly than was formerly possible, and these effects as well as the factors causing variation in nitrogen content of any given variety are comprehensively discussed in the report. Similarly, the factors affecting 1,000-corn weight and those causing variation in yield are indicated. The main influence on the former appears to be the weather in spring, while both soil and season have important effects on the latter.

The Strawberry Industry of South Hampshire. By Edgar Thomas and G. B. Bissett. Pp. viii + 86, with tables, charts, maps and illustrations (Cambridge: W. Heffer and Sons Ltd. 1933. Price 2s. 6d.)

The workers in Agricultural Economics at the University of Reading have studied, by the survey method, the Strawberry Industry of South Hampshire and published a final report. Full details of the industry, including general organization, production, marketing prices and the returns obtained are given, and, in addition to the purely descriptive matter, the data obtained have been carefully analysed. The report contains practical recommendations that dispassionate and sympathetic observers believe to be most likely to improve the present straitened condition of the industry. This bulletin might well be regarded as a model for a large number of other economic surveys that would be of immense value both for increasing knowledge and for rationalizing agricultural industry.

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

Vol. XL No. 11 February, 1934

NOTES FOR THE MONTH

Import Duties on Oats and Oat Products

THE following Press notice was issued from Treasury Chambers on January 12:—

On the recommendation of the Import Duties Advisory Committee the Treasury have made an Order under the Import Duties Act substituting for the existing *ad valorem* duty of 20 per cent. on *Oats and Oat Products* the following specific rates of duty as from January 13:—

Oats in grain	3s. od. per cwt.
Oatmeal, including all cuts of oatmeal, oat groats, rolled oats, flaked oats, oat flour, and feeding oatmeal or ground oats; but not including oat husks, oat dust or oat husk meal	7s. 6d. per cwt.

The Committee state in their report that not only has the existing duty, which was raised to 20 per cent. in September last, failed to restrict the importation of foreign-grown oats, and oat products of foreign manufacture, but that these commodities are being imported in increasing quantities and are being offered at prices which are actually lower than before the imposition of the additional duty, and, in many cases, well below the costs of producing similar articles in this country.

Oats as a marketable crop are of primary importance to the agricultural interests of this country, particularly to the farmers of Scotland, and in the Committee's opinion, it is desirable to take further steps to restrict the very low-priced foreign imports. An alteration in the duty on oats involves a consequential alteration in that on oat products, the home manufacturers of which have been similarly affected by increasing importations of low-priced foreign commodities.

The Committee consider the new rates of duty to be high, but necessary in view of present conditions. They intend,

however, to keep the situation under careful review, and should the conditions materially change they will be prepared to recommend such variations as may appear to them expedient.

The Order, together with the Report of the Advisory Committee to which it gives effect, is published by H.M. Stationery Office.*

Power Farming Course at Harper Adams College

THE widespread interest now displayed in the application of modern power appliances to farming was very effectively demonstrated by the success of the Second Power Farming Course held at the Harper Adams Agricultural College, from January 1-6 last. The attendance of some 40 visitors at the first Course held in January, 1933, by way of experiment, was far surpassed at the Second Course, throughout which the residential accommodation of the College was taxed to its fullest capacity. The attendance at the individual lectures was never below 80, and on many occasions more than 100 were present.

The "students" were drawn from a very wide area, including Scotland and Ireland, and represented a variety of interests. The audiences were very definitely agricultural, most individuals being practical farmers, while there were present many members of county agricultural advisory staffs, the balance consisting of members of the technical staffs of manufacturing concerns interested in agriculture.

Apart from the formal addresses and discussions, which were very keenly followed, the visitors showed great appreciation of the opportunities afforded between the sessions for informal interchange of experiences and opinions, and discussion of the farmer's needs in connexion with new machinery.

The dominant note struck at the very outset, and maintained throughout the Course, was that the ideal behind "power farming" should be the correct application of power on all classes of farms to increase productivity, to eliminate wastage of labour, and to employ the labour saved in profitable outlets, rather than the narrow aim embodied

* Cmd. 4486, price 2d. net, post free 2½d.

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in "mechanization," the displacing of man power by machinery, and the growth of low-yielding crops made profitable by low costs of production.

That this view was generally approved was clearly evident in the small interest displayed in "prairie" farming as compared with the general interest in proposals designed to attain to better standards of farming with the aid of machinery.

The field demonstrations were designed to amplify the lectures, and about a dozen tractors, including several new machines, were engaged in mole draining, pasture cultivation, ploughing, etc. A demonstration of night ploughing was given, and equipment for the production of meal from young grass was also shown at work. Food-preparing machinery, electrical equipment and milking machines were among the other notable items. A general educational exhibit, staged by the advisory staff of the College, provided added interest for farmer visitors.

Courses of this kind can hardly fail to prove of real value to farmers generally, and to raise the standard of production.

The Improvement of Grass Land

THE following note has been communicated by Mr. H. Rhys Williams, B.Sc., the Agricultural Organizer for Middlesex:—

Measures for improving grass land, in the areas of North Middlesex and South Hertfordshire that surround the town of Barnet, form the subject of a recent Report,* jointly issued by the Agricultural Education Authorities of the two counties.

The Barnet district was once famous for its hay, for which indeed, it became the chief source of London's supply; and the system of farming then adopted, with provision for this trade in view, was developed to give the bulkiest crops of hay. London stable manure was returned to the meadows of the district, which were often heavily grazed by horses sent out of the Metropolis for a rest. Latterly, with the falling away of the hay trade, there has been an increasing use of the grass for stock feeding, and the district is now

* Report on the Barnet and District Grassland Competition, 1932, conducted by the Hertfordshire and Middlesex Agricultural Education Sub-Committees in conjunction with the Barnet Branch of the National Farmers' Union. September, 1933.

NOTES FOR THE MONTH.

mainly concerned with milk production, with sheep, and, to a lesser extent, with fat cattle.

The scheme of improvement took the form of a competition, having the following objects:—(a) to stimulate care and attention for the pastures of the district; (b) to encourage the growth of clover on these pastures; (c) to demonstrate that the grass crop quickly and amply responds to skilful management; and (d) to inaugurate an advisory service on modern methods of grassland management.

The competition attracted 21 entrants, the total area of their farms approximating 6,000 acres. Every field on the farms was closely examined on two occasions during the year of competition, and marks were awarded on a prescribed scale. The close scrutiny revealed the factors chiefly responsible for the prevalent poor herbage, and these factors may be briefly considered here as the bases upon which recommendations for improvement were made.

Drainage.—Want of adequate drainage was, undoubtedly, the chief predisposing cause for poor herbage. The land is mostly heavy clay, with occasional intrusions of lighter soil types. Many swards were waterlogged, the ditches being filled and the outlets of any existing drains stopped up. Such fields produced a characteristic herbage of fescue and bent, with such weeds as tussock grass, sedge, rush and creeping buttercup—of little value for feeding stock. Invariably, there was much poaching, with the presence of other weeds, chiefly daisy, plantain and hawkweed. In contradistinction, on some farms, where the ditches had been cleaned out and mole drains put in at a depth of 18 in. and 9 ft. apart, it was gratifying to observe that the grazing had been transformed into excellent herbage, four or five times as valuable as the original poor grass.

Mat.—Another adverse factor was the matted state of the turf, the result of lack of proper control in previous years. On certain fields, this matting had attained such density that it precluded any hope of improving the turf through the ordinary processes of grazing and treading by cattle. The conditions called for the break-up of the mat, and, as the result of a demonstration (held in the district) with various types of harrow, the pitch-pole harrow was adjudged the most effective for the purpose. Where the grass was less tufted, the spiked-chain harrow proved

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equally efficacious. It may be emphasized that, as a first step in the process of producing a quality herbage, the operation of tearing up a mat can hardly be made too severe. Effective harrowing naturally creates a good deal of debris, which is usually left upon the surface to decay: this decay can be assisted by scattering the debris after it has lain for a time, a procedure that is justifiable where the field is to be grazed. When, however, a meadow is to be mown, it is desirable to remove the debris, but removal is unfortunately prohibitive in cost. Implement makers may possibly find some ingenious way of meeting this difficulty.

Manuring.—When the turf, by draining and harrowing, has been brought into a well-aerated condition, it is opportune to apply manures and further consolidate the improvement by effective grazing. Previous practice and experiment in the area has shown the value of applying to grass land adequate quantities of phosphate along with potash. As a general recommendation, good results will follow a dressing of ground mineral phosphate at $3\frac{1}{2}$ cwt. per acre, or 7 cwt. per acre of high-grade slag, together with 1 cwt. per acre of potash salts for heavy soils, or 2 cwt. potash salts on lighter soils. These fertilizers can be obtained ready-mixed as potassic mineral phosphate, of which 5 cwt. per acre should be applied; or as potassic slag, which should be put on at the rate of 8 cwt. per acre. Naturally, the compound with the higher percentage of potash should have preference for the lighter soils. The above dressings would suffice, normally, for 4 years. For hay, it was suggested that the above dressings should be alternated with farmyard manure applied every second year. As regards lime, its uncertain action upon grass makes it a problem; and its use should be governed by the results of preliminary “try-outs” on a few strips of the grass.

Grazing and Cutting for Hay.—That the growth of grass should always be kept under control was enjoined as one of the golden rules of grassland management. The deterioration visible in the quality of some of the fields showed clearly the need for adopting this rule. Where such evidences prevailed, a freer use of the mower was recommended to maintain evenness of sward. Generally, the tendency was for too-late cutting of the hay, to the detri-

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ment of its quality and that of the aftermath. That grass land should be grazed quite bare at least once during the year was another emphasized rule, the observance of which induces the appearance of some of the finer-quality herbage plants—notably, wild white clover.

Worn-out Pastures.—In this, as in most, districts, there were a number of worn-out pastures that should be ploughed up and re-seeded. The low productivity of these poor pastures calls for radical treatment. Only a modern seeds-mixture is worth using.

An Argentine Trade Exhibition Ship

An idea for a travelling exhibition of Argentine produce and manufactures, to visit the principal countries of the world, was mentioned in the Argentine Press last autumn. The project was taken up with such enthusiasm, that arrangements were quickly instituted for carrying it into effect, and these have now been completed. A private syndicate, with the full approval and support of the Argentine Government, has chartered the Royal Dutch Lloyd steamer *Gelria*, 13,700 tons gross, and this vessel, built just before the War, and long engaged in the River Plate service, has been converted for the purpose of housing a floating exhibition.

A world cruise has been planned to last from March to December this year, in the course of which the vessel will call at 56 ports in 32 countries, about 140 days being spent in ports and 160 days at sea. The time to be spent at the various ports, i.e., the actual exhibition time, will range from 1 to 10 days.

As at present arranged, the S.S. *Gelria* will start from Buenos Aires on March 11. After calling at a number of Atlantic ports in South and North America, it will reach London on May 19 for a week's stay.

Duty on Imported Turkeys

On page 917 of the January, 1934, issue of this JOURNAL, in the article on "The British Poultry Industry, 1932-33," the import duty on foreign turkeys (dead) was, by a typographical error, stated to be "now 6d. per lb." The correct figure is 1d. per lb.

NOTES FOR THE MONTH

Inspection and Certification of Narcissus Stocks, 1934

THE Ministry of Agriculture and Fisheries is prepared to undertake the inspection during the coming season of growing stocks of commercial varieties of narcissi, with the object of certifying them if found to be true to type and reasonably healthy. The foliage and flower will be examined in order to ascertain that the stocks are reasonably free from rogues and are growing vigorously. Any certificates that may be issued will refer solely to the purity of the stocks, but certificates will not be issued in respect of any stocks that are obviously unhealthy or lacking in vigour at the time of inspection.

A register of growers whose stocks have been certified will be published by the Ministry at the end of the inspection season.

Further details of the scheme, including particulars of the fees payable, and forms of application for inspection to be carried out, may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1. The latest dates for the receipt of applications are as follows:—

Scilly Isles, Cornwall, Devon and				
Somerset	...	...	...	March 1, 1934.
Other districts	...	...	...	March 15, 1934.

Applications arriving after these dates will not be considered.

Imperial Agricultural Bureaux

THE Executive Council of the Imperial Agricultural Bureaux has elected Sir Charles Howell Thomas, K.C.B., K.C.M.G., the representative of the United Kingdom on the Council, as Chairman in succession to Mr. F. L. McDougall, C.M.G., the representative of Australia, whose period of office has expired.

Soils Correlation Committee

THE Soils Correlation Committee, set up by the Ministry of Agriculture and Fisheries (for England and Wales) and the Department of Agriculture for Scotland, has now pub-

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lished its Second Report, which deals with the survey and correlation of Scottish soils. A few copies of this Report are available for issue to those interested in this subject, and applications for them should be addressed to the Secretary of the Committee, Mr. E. A. Burgess, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Agricultural Machinery Testing Committee

The undermentioned Certificate and Report, issued by the Ministry, have been published in pamphlet form (price 2d., post free 2½d.):—

No. 47. "Lingard Cotton Wool Milk Filter Discs," submitted for test by Messrs. Joseph Lingard, Ltd., 6, Bayer Street, London, E.C.1.

The test was conducted at the National Institute for Research in Dairying, Shinfield, near Reading.

Copies of the pamphlet may be obtained, at the price stated, through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

THE FUTURE OF AGRICULTURAL SCIENCE*

Sir DANIEL HALL, K.C.B., LL.D., F.R.S.,
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I OWE you an apology for attempting in an informal talk to assume the position of a reviewer of the way agricultural science is being pursued at the present time. I would like to begin by asking you to bear in mind the enormous increase in the specialization of science. I recall, for example, that it is almost exactly fifty years since I was taking my final examinations at Oxford in chemistry; and, at that time, students who were taking the Honour School of chemistry at Oxford were expected to be acquainted with the whole of that science, and to have read it right up to current research. We were expected to be able to answer questions about investigations that had been published, say, within a year of taking our examination. That was only fifty years ago. There was, indeed, a differentiation between organic and inorganic chemistry; but the more modern differentiations of physical chemistry, bio-chemistry, colloid chemistry, electro-chemistry, etc., were entirely unthought of. Then, as I say, one man was supposed to be able to cover the whole subject. At the present time, of course, no man pretends to know the whole of physical chemistry, still less the whole of chemistry, even if he is spending his life at it, and is not merely an undergraduate undergoing his final examination.

I think the same thing holds true very much with regard to the progress and the methods of agricultural research. Looking back, I realize that the formal organization of agricultural research in England has taken place during my lifetime, although research existed, of course, long before then. The Experimental Station at Rothamsted began nearly a century ago, but it was then a private institution, receiving no assistance from the State. It did, in fact, represent, with one or two minor exceptions, the whole of

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the agricultural research that was then going on in Great Britain.

Somewhere in the late "eighties," and more particularly in the "nineties," organized agricultural research got a start in Great Britain; and when I look back upon my colleagues of that time; who were recruited from the various fields of science to begin the new work, I see a very different type of man from the current research worker, for, in those days, a man was supposed to be able to cover the whole field of agriculture and the sciences depending upon it. I can best give you an example by recalling to you the late Professor T. B. Wood, whom many of you knew. For many years he was Director of, and indeed the creator of, that great school of agricultural science at Cambridge. Now T. B. Wood was indeed the all-round man of science in connexion with agriculture. He was a farmer in the first instance, born and bred upon the farm. He went on farming himself; during the whole of his Cambridge career he was running a farm of his own, farming, as he was always proud to say, out of his own cheque book and not with the resources of some institution behind him, and therefore having to make it pay—and indeed he *did* make it pay. Besides that, he was the head of the Institute of Research in Animal Nutrition at Cambridge. And he *was* the head of it, that is to say, he was the originator of the methods of work, and he was controlling and directing research in that particular field. He, of course, was head of the School of Agriculture, and, as such, was responsible for the general oversight of the other institutions that dealt with animal diseases and plant breeding at Cambridge. He had papers to his credit on such diverse subjects as the composition of mangolds, the colloids of wheat flour, Mendelian inheritance in sheep, and probable error in experimental plots. Well now, we are not likely again to see men of that type, who have this immense all-round acquaintance with all the developments of science in connexion with agriculture. They were men like the Greek, Milo of Crete, who by practising with a calf gradually grew up to be able to carry a bull. Nowadays, the investigator is confronted with a full-grown bull, and cannot begin to learn to carry it.

Specialization, then, is a fact to be faced. We recognize the enormous power of the specialist, his way of penetrating into the mysteries; and, in agriculture, we are concerned

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with that most mysterious of all things, life. Yet we have to guard against some of the dangers to which our research is exposed. The danger arises, perhaps, from the interest of the subject itself. If you get a man working intimately, closely, with some problem of soil or of disease, he becomes so fascinated with the pursuit of knowledge that the end to which his researches are directed is forgotten in the interests of the problem itself. The means, as it were, become far more important than the end. This is almost inevitably so; and, of course, some of these problems, as in soil physics or some of the elusive problems of mycology or of genetics, lead on and on with no prospect of finality, so that the investigator settles down, as it were, for life. He will have colleagues in other countries similarly carried away by this intense specialization, until in the end a sort of bridge party is made up. A worker in the United States "leads"; somebody in Jugo-Slavia plays the next card; there is a third person in England, perhaps, who joins in; and then you have a fourth from Holland or Sweden to play. These people all exchange papers with one another. They all feel very important and are entirely interested, but wholly indifferent to those outside the party. I had an instance in my laboratory not long ago, when one of my colleagues had prepared a paper. I toiled over this paper, day after day, trying to get it, as I thought, intelligible—at any rate, intelligible to me—and about the tenth day, after talking it over, I said: "Look here, you must begin again and write this all over again; it is not really intelligible." And the lady—it was a lady in this case—turned to me and said: "What does it matter—there are only five people in the world who will read it, and they will understand it." Well, that is the sort of game that our science may so easily become.

This high specialization exists: it is inevitable; and we cannot get the best work done, and we cannot solve, or even get an appreciation of, many of the difficult problems that are before us unless we have such specialists each at liberty to go on working in his own way, and pursuing his particular bent to the utmost. But can we not do something to make these people human? In order to do that, let us try to ensure that they have contacts with agriculture itself. In my own particular field, at the present time, I am concerned with genetics and plant breeding. But one has to try to

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make the young workers, taking up genetics, become interested in plants and in the actual growing of plants. They must not treat the plants that are being grown, perhaps by the thousands for their particular genetical study, as merely laboratory units, but as living things, possessing other points of interest than crossings-over in certain proportions, or chromosomes in certain positions.

What we have to try to ensure is that all our workers are making contacts with the practical men. We do this first of all to ensure that their work will have some immediate practical purpose; of course, we must ever remember that the purest scientific work may suddenly bloom into something utilitarian. Just think, for example, of the number of men and of the length of time that was spent in the minute study of the nuclei of plants and animals, work which eventually defined the chromosomes and revealed the processes of mitosis and meiosis. For years and years that was abstract, pure science without the slightest thought that it was ever going to be of any practical value. Suddenly it blossomed, and, in the hands of Morgan and his colleagues, this study of the nucleus provided a physical basis for the Mendelian generalizations. So we obtained the whole material basis of the regulated breeding of plants and animals out of that bit of abstract, pure science. None the less, I think we are more likely to get even our pure science work vital if we can persuade the workers to be agriculturists, horticulturists, and, above all, naturalists, who have their eyes upon the living, growing organisms. It is peculiarly important in another way. Often, it is only when you turn to the practical man, who is working upon a very large scale with plants or animals, that factors are disclosed, exceptions are thrown up, and difficulties are discovered, which do provide a lead, perhaps, into the ocean of pure science itself; and, therefore, it is good, from both the pure science point of view, and the immediate needs of the practical man, that all our research workers should have their ears to the ground.

How can that be done? Well, as a working method, can we not allot to each of our workers in the laboratory, together with his real fundamental problem that may require years of investigation, patience and the collaboration of many people, some proximate, short-term problem that arises from farm or garden itself? The one will give

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him his contacts and may suggest further long-term problems; the other is, of course, his permanent fixed occupation. I think it is a reasonable way of going to work, to see that the abstract research worker has also a practical investigation, which may bring some immediate help to the farmer or the gardener.

May I pass on to consider, briefly indeed, what are the directions in which scientific research in regard to agriculture may probably be guided most profitably at the present time. I embark upon that question with a little more confidence in that we have recently set up in Great Britain an Agricultural Research Council, the opposite number to the Committees dealing with Scientific and Industrial Research, and with Medical Research in our country. It has been the duty of this Council to carry out a general review of the agricultural research that is in progress in Great Britain, and, in so doing, it has had, almost necessarily, to think a little about what is going on in the Empire and in other countries. While the review is by no means complete, I think we begin to get the various subjects into a little perspective, and to see something of their relative importance. Perhaps the subject that has most been pressed upon us, the one which to most people seems to require the most strenuous effort, is the question of animal disease, or rather, as I should put it, the question of ensuring animal health. Many people consider that the most pressing of all the problems before us.

I am bound to say, while reporting this as the general opinion, that I do not personally altogether agree, because I am looking at the problem from the point of view of health rather than of disease. I see the task of the people who are dealing with the health side of animals to be, in future, very much more hygiene and the maintenance of health than the cure of disease. What I would like to see is a class of veterinarians who are officers of animal health rather than practitioners. There must always be practitioners who are concerned with surgical cases and with specific illnesses of valuable animals, but it seems to me that the great efforts of the profession should be rather of a public nature. Instead of being called in to this ailing cow, or that fretting horse, we want to see a class of men who have charge of a district, who are thinking about the horses, the cattle, the sheep and the pigs and how to keep

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disease away from them. Naturally, they will have to know about the endemic diseases, but breeding, environment, nutrition, and other factors in hygiene will be equally important. I think that is going to be the direction in which the veterinary profession itself will eventually move, and that the veterinarian of the future will be the kind of public officer who is taking prophylactic and preventive measures and who is studying problems like nutrition and so forth, so as to ensure a greater amount of health amongst the animal population. It is only latterly that we have really begun to appreciate what an enormous factor nutrition is in the health of live stock; we do not even yet know all that is necessary.

From another point of view I think we shall really have to attack these problems of animal disease and their occurrence from the genetic standpoint. We know of course already, in dealing with plants, how a great number of diseases can effectively be dealt with by breeding immune races. We have succeeded in breeding races of potatoes which are immune from wart disease (*Synchytrium endobioticum*), a disease which a few years ago threatened to wipe out potato growing in many districts of Great Britain. In all kinds of directions we can see how the most profitable and certain attack upon diseases in plants is to breed a race that is immune. We cannot dispense with measures of spraying at the present time because it takes time to breed immune varieties—first to find immunity, and then to breed from it. And when you are dealing with fruit—well, a generation of apples in our country means seven years, and so the research worker will not get very many generations in his own lifetime. Still, this line of attack has been so profitably pursued in many directions that one can be reasonably sure that, in the end, our real method of dealing with disease in plants will be from the genetic side. I think the same method will come amongst animals. There are instances which show you that certain kinds of immunity are inherited through characters subject to laws of inheritance that have been worked out for other characters. If, then, we are given time and space and numbers, I think we can do much to create races which will be immune to many of the diseases that cause such large monetary losses at the present time.

That leads me on to consider another very big problem

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before us. Many of our economic problems in dealing with animals, besides this one of disease, can be solved if we can only set to work at the breeding of animals with the same intensity, and on a scale comparable with the methods, that we have employed with plants. It is going to be a more difficult matter because of the complications due to sex, difficult also because so many of the characters of animals are governed by environmental conditions as well as by genetic make-up. We shall have to deal with large numbers of animals, and that means expense. Such work, again, becomes difficult because we have to fight to a certain extent against the inherited traditions of the farming community. I say we have to fight against the inherited traditions because we do come up against the devotion of the best farmers to their conception of pedigree. If you are going to set to work and breed, say a new type of sheep that shall combine a great many advantages at present scattered about amongst the different breeds of sheep, you at once are opposed both by the vested interests in existing breeds, and by that instinctive, persistent, long-inherited tradition of the farmer that pedigree is a thing to look to for its own sake. Pedigree was a great step in its day, and the principles that were laid down by the earliest breeders of animals have done marvellous things in improving live stock. Yet, as you all know, pedigree that is founded simply upon records of breeding and upon show performance is not really sufficient. I have been interested to notice how much progress you are making in Canada in working out performance records and new types of pedigree for many classes of live stock that will, for instance, in regard to milch cows, show records of performance in the past—records of the performance not only of the dam, but records of performance of the bull showing his ability to get better milk-producing stock. We are tentatively beginning to recognize performance records of that kind with regard to the breeding of pigs. We do not simply want to know that the boar is of such a line and won such-and-such prizes at various shows; we want to know the record of the litters he got, and how steadily he carried with him a commercial degree of prolificacy. For all the animals that we have to deal with, we need this new conception of pedigree, one that is based upon performance and will be an assurance of performance in the future.

I want, however, to go farther than that, and to begin re-creating. I do deliberately say that the time has come

when our knowledge of the laws of inheritance, that have been worked out in connexion with the smaller animals at the present time, has become sufficient to enable us to step forward and create new breeds. I call them synthetic breeds, because I want to put together within our new breeds many of the excellent characteristics that at present are confined, perhaps, to one or two breeds only. It certainly can be done. The only question is whether any of us will have the courage to set to work upon a scale, and to face up to the financial expense that such breeding will involve during the early stages.

One can begin to see not only that the time is ripe for such work from the scientific point of view, in that we are beginning to have sufficient knowledge of how to breed for milk or wool, but that we are perhaps getting to the stage when we can see from the economic point of view how it can be done. After all, are we not in Great Britain just beginning to feel out towards—I will not say simply co-operation in agriculture—but towards a planned agriculture. A planned agriculture will involve a certain amount of direction and control of methods—though not necessarily the actual work—of the farm. At the present time, when contributions for research are being cut down, it would not be much good asking for a farm of adequate size, and, say, 20,000 head of cattle to begin a new breed. Yet, if there is central market control, it ought not to be so difficult to ensure the co-operation of, we will say, 200 farmers—each with a certain number of cattle—towards such a common objective, that the cattle are all to be bred under direction, generation after generation, towards a new synthesis, a new type of breed. It is quite true that, at first, you would be producing a set of mongrels; but then the loss to each individual through the mongrels would never be great, and would disappear as the new breed emerged. I believe that some such organization will make it possible to ensure a genetic improvement in our existing breeds of live stock.

I am bound, however, to tell you that, when I have thrown this idea out in public in Great Britain, it has been received in the coldest fashion by any farmer who happens to hear it.

On this occasion, talking in an informal way, you will not want me to say anything about the problems of genetics

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in plants, particularly the problems of disease and that most insidious class of diseases lumped together as virus diseases. Sometime, there may be another occasion on which I shall be able to deal with these questions. Nor, again, do I think this the occasion to discuss many of the new lines of thought that have been pointed out for us in considering problems of the soil.

If there is one other line of research which one really would like to say something about, it is the field that is opening up with regard to the minute physiology of plants. One of the difficulties in dealing with plant physiology in the past has been the purely technical one of analysis. New methods of micro-analysis are being worked out to an extraordinary degree, and appliances that are being put at the disposal of the research worker engaged with the intimate physiology of plants are altogether outside our conception of even twenty years ago. It was only the other day, when I was in Pasadena, that I was shown the methods by which micro-analysis of the chromosomes is being attacked at the present time. It is now possible to identify certain mineral elements in particular chromosomes of a plant. Well, that is pushing refined analysis to an extreme; and, as I say, in the light of these methods and some of the results that have already accrued, I believe this is going to be one of the most fertile lines of attack that remain open before us. It is an extraordinarily difficult method to follow, but one which will have a bearing upon our practical problems of plant growth in many and diverse directions.

However much we look over the field of agricultural science, and research work in connexion with it, we are sooner or later up against the big economic problem. What is the good of all our science, and what is the good of all our research, if the fundamental basis of agriculture, as a means of enabling men to live by tilling the soil and raising animals, is wrong; if the farmer cannot get a living, and if the improvements that we can promise from our science weigh so little that they cannot overcome these fundamental economic problems? This point of view is something that those of us who are dealing with research in agriculture cannot afford to put out of our minds; that, behind all our efforts, behind all the improvements that we may suggest, behind the transformations that we can make in our farming, we have to consider the ultimate transformation of the

farming individual. Yours is almost single-man farming, ours a little more organized into small capitalist units; how are such men to be fitted into the organization that modern thought, modern science, modern improvements seem to demand? The demand is insistent—the human mind once having got upon this efficiency track will go on pursuing it. The agricultural problem is how to ensure this type of efficiency while, at the same time, not effecting utter social disorganization by entirely knocking out the individual peasant farmer. At present the competition between the peasant and the great organization is still, perhaps, a little doubtful. I do not think the case for the big organized scientific farm has yet been proved up to the hilt.

Only the other day, I was taken over one of these big organized ranches in Southern California, something like 6,500 acres, chiefly under fruit crops of one kind or another, all managed with the sort of efficiency and organization that we normally associate with the factory. The control of labour and materials, the organization of transport and marketing—all, from a casual inspection, and some examination of the books and records, seemed to me just about as good as you could possibly get. Yet, with all that, the people who are running the farm confessed to me that they did not know whether they were really going to succeed or not, as compared with the little individual man who had his ten or twelve acres of oranges or of apricots, and did all the work himself.

The utmost advantages, as I say, of organization and science, wealth and capital, and so on—big business *in excelsis*—were still fighting a not-certainly victorious battle against the family farmer, who is willing to put in his twelve or sixteen hours a day on his own little potato patch. Well, I cannot but think that, in the end, the big man with this form of organization is going to win out. Up to the present time, the individual has kept his end up by working twelve hours a day, and by indenting upon the time of his wife and his children. In many countries, he shows that he is getting rather tired of the job and prefers to earn wages at the factory that has sprung up nearby; or, at any rate, if he sticks it out, his children are not disposed to carry on in quite the same way. We can see, in the Old World, the disintegration of the peasant system under the attractions of industry and the pressure on prices started by the big

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organized farm, which in many quarters has progressed far enough to have made the living of the peasant very precarious.

As I say, that is the ultimate problem that is before us. We are all aiming at efficiency, the more efficient production of plant food from the soil, and the more efficient conversion of that same plant food into animal food. Every time we have one of these revivals in efficiency—and revivals have been effected within our time—there is a renewed attack upon what is after all the mainstay of farming all over the world—the individual, single-man, peasant cultivator. I think it is up to us to have that problem always before us, and to see that economic investigations go hand in hand with our scientific investigations. The one great objective in these economic investigations ought to be to see how far it is possible to organize these individuals, who are, at present, weak, scattered units—to organize them so that they can take their part in one of these big, efficient organizations and yet remain still independent human beings, inheriting the value of their own initiative and hard work.

SOME IMPRESSIONS OF BRITISH FARMING—I

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THE writer has lately completed a fairly extensive tour of Great Britain, with the object of looking into present-day rural problems. Some of the impressions formed have already been discussed in a series of broadcast talks. In the present articles, it is proposed to summarize these impressions, and to deal, rather more fully than was possible in a series of popular talks, with the technical and economic problems of farming.

South-Western Scotland.—Dairying is by much the most important section of the farming industry in the south-western area of Scotland. There is, it is true, an important early-potato growing district round Girvan in Ayrshire; and, in the upland parts of the district, there are many remarkably fine flocks of the mountain breeds of sheep. Lanarkshire, for instance, contains most of the famous ram-breeding flocks of Blackfaces, and commonly produces, for the annual ram sales, a number of individual sheep whose prices run into hundreds of pounds. Kirkcudbrightshire has, on its green hills, a fine type of Cheviot, and the upland moors of Dumfries and Galloway breed some fine specimens of Galloway cattle. For the most part, however, the modern farming is based on the Ayrshire cow, and either on liquid milk or cheese.

Commercial dairying began here upon a considerable scale towards the end of the eighteenth century, at which time the Ayrshire breed came into existence. Before that time, a great deal of the land was unimproved heather moor, needing enclosure, drainage and lime before it could be made to carry crops. The only considerable cash products were store cattle, principally Galloways, and store sheep. The cattle, at three or four years old, were sold to drovers who took them, by way of the old drove roads, to the eastern counties of England, where they were fattened for the London market. For the rest, the farming system was based largely upon the needs of the farmer's household; the land produced oats, barley and potatoes, as well as cheese, for food; wool and flax for clothing; while the peat-mosses supplied the farmer's fuel.

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With the growth of Glasgow and other towns, there grew up a demand for milk and dairy produce. The Ayrshire cow gradually displaced the Galloway on all but the poorest land, and the farming soon became rather highly specialized. A large proportion of the land is now arable, but the long ley is almost an invariable feature of the rotation. The district, indeed, grows very heavy crops of oats, but the frequent rains in harvest time prevent the grain from reaching the high standard of quality that is attained by growers on the east side of the country. The crop, therefore, is largely used—both grain and straw—for stock-feeding. Generally, the succession of arable crops is oats—roots—oats; but, on the heavier clay soils, the root crop is sometimes omitted and the rotation reduced to two oat crops and a seeds ley. Some farmers take a silage crop on the ploughed-out turf, follow with oats and sow down again to grass.

Most of the land is sown down with the relatively simple type of grass-seeds mixture that is common to other districts; but farmers, who have a proportion of strong clay or peaty soil, make a good deal of use of timothy meadows. In the ordinary leys, which are commonly mown for hay during the first year and, thereafter, grazed for three, four or five years more, it often happens that, with the hard grazing of the milking stock, the top grasses, such as cocksfoot and timothy, soon disappear, and the sward, in its later years, comes to consist largely of ryegrass and wild white clover. The general use now made of the latter plant has been of immense benefit to the area, the carrying capacity of the leys, in their latter years, having often increased to the extent of fifty per cent. or more. It is still true, however, even where ample applications of phosphates are made and where grazing is carefully controlled, that, after a few years, Yorkshire fog and bent begin to creep into the sward; where this happens, and before deterioration has gone too far, the land is ploughed-out, cleaned by arable cropping and re-sown.

The wild white clover, quite indispensable as it is, cannot be regarded as an unmixed blessing. On certain farms, at certain times during the summer, it causes a great many cases of hoven in the cattle, although the precise conditions under which this occurs are not understood. Dr. McCandlish, of the West of Scotland Agricultural College, is giving a good deal of time to the problem. It seems possible,

also, that the heavier stocking which the clover ley makes possible may lead in time to more difficulty with other diseases. Thus far, the area is rather exceptionally fortunate as regards the incidence of some of the worst bovine diseases, such as tuberculosis and Johne's disease. Dr. Wright, of the Dairy Research Institute at Auchencruive, has shown that the complete eradication of tuberculosis can be effected by the combined action of all the farmers in a district. This is understandable when it is remembered that most of the farms are more than self-supporting in the matter of dairy stock; and that the mild climate, and the supply of clean pasture, enable the young stock to be reared practically out of doors. Tuberculin-tested herds are very numerous.

The timothy meadow is an interesting feature of the farming. The land is sown down with about 20 lb. of timothy seed and a little Italian ryegrass and red clover. The ground is very intensively manured, the annual dressing of nitrogen running to about 3 cwt. of sulphate or nitrate, in addition to dung and minerals at intervals of a few years. Only one cut is taken, rather late in the season, and the aftermath is used for grazing cows and wintering sheep. Yields in Ayrshire do not usually reach the extraordinary figures that are attained on the clays of the Carse of Stirling, farther east. In the latter area, 4 tons per acre is common, and 5 tons not unknown. Even on ordinary clay soils in Ayrshire, however, yields of $3\frac{1}{2}$ tons, or more, are not rare. The life of a timothy meadow varies from five to twelve years, and may reach an average of about seven. The thinning out of the plant and the intrusion of Yorkshire fog sooner or later require the ploughing out of the fields.

There is no doubt that the efficiency of the milk industry in this area has reached a very high level and is still improving. The output of milk per cow has been going up ever since 1908, when systematic milk-recording was started. A very small proportion of heifers come down with really unsatisfactory yields. The carrying capacity of the land is very high in relation to its natural fertility, and seems to be still rising. The fairly general use of milking machines has enabled the larger outputs to be maintained without the necessity of adding to the labour staff. A good deal of the work in the cowsheds and dairies is done by women. Farmers are deriving substantial benefits from the spreading popularity, in the southern half of Great Britain, of the

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Ayrshire breed, tuberculin-tested heifers of good type being in active demand at very satisfactory prices. The popularity of the Ayrshire seems to be justified by its consistent performance, robust constitution, and adaptability to poor land and exposed situations.

As in other parts of the country, the urgent problems of farming are not those of production but of marketing. Over-supplies of liquid milk, and the low prices of imported butter and cheese, have driven down the price of manufacturing-milk to a level that would have been ruinous even in times of cheap labour. It is true that costs, at least as regards summer producers, have been got down to a level that few other districts can touch; but, during the past summer, milk from the remoter districts was being delivered to creameries at figures like $3\frac{1}{2}$ d. per gal., or something like half the figure required to enable the efficient producer to live. The task of organizing the marketing of milk in Scotland was beset with great difficulties, and a considerable minority of producers is dissatisfied with the scheme that has just been put into operation. The prospect last summer was, however, one of the imminent ruin of the industry, and it seems reasonable to hope that this, at least, has been averted. It remains to mitigate some of the admitted hardships of certain classes of producers.

It is a pleasure to record the establishment of a great new centre of education and research at Auchencruive, near Ayr. The Dairy School, the Dairy Research Institute and the Experimental Farm are all equipped on the most modern lines, and the amenity of the surroundings is such as may well excite the envy of students, teachers and research workers at other centres. Principal Paterson will deserve the gratitude of many generations of farmers for carrying through so well conceived a plan.

The Scottish Highlands.—The Highlands of Scotland are better known in these days for sport and scenery than for farming. Yet the sheep industry keeps its place as the main support of the people. It would be too much to say that the industry is prosperous. No considerable profits have been made in recent years, but, taking the whole period since the Great War, mountain graziers have been less unfortunate than lowland farmers. The small joints and lean mutton of the mountain sheep are what the consumer now wants; and coarse carpet wool, such as the Blackface breed produces, has been in relatively good

demand. Moreover, markets in 1933, both for lambs and wool, have been substantially better than those of the previous year.

Change in an industry like mountain sheep farming is necessarily slow; but, if one talks with old men whose memories stretch back fifty or sixty years, it is clear that the farming is by no means stereotyped. During this period, the emphasis has shifted from wool to mutton, and the coarse-woolled, hardy Blackface has made steady encroachments upon the territory that once belonged to the Cheviot. Again, old butchers will tell you that the quality of the Blackface carcass has improved out of recognition. It is blockier and more meaty, and is commonly presented, even in the form of young lamb, in sufficiently fat condition. Partly because of the improved early maturing qualities of the breed, partly because of the lower prices for wool, and partly, again, because some of the poorest grazings have been given over to deer, the old flocks of two- and three-year-old wethers have practically disappeared, the great bulk of the output being marketed nowadays as fat or store lamb.

Improved transport has overcome the greatest risk of mountain farming—that of wholesale deaths of sheep from starvation in periods when the natural food is covered with frozen snow. Marketing is highly organized, the lambs and draft ewes being most carefully graded and ordinarily sold at large auctions in lots of such size as buyers require. Inverness, “wool fair” is a rather unique type of market, where very large numbers of sheep change hands without being seen by the buyers. The bargains are made privately, the prices being settled according to the past reputation of the particular lots, the weather, as it is expected to have influenced the condition of the sheep, and the general price level in the sheep market. A growing proportion of the annual wool-clip is being sold through the co-operative society known as Scottish Woolgrowers, Limited. There is a considerable export of Blackface wool to Italy, the coarser qualities being demanded for this trade. High transport charges for sheep are, perhaps, the greatest difficulty of the mountain farmer in these times of falling values.

The North-East of Scotland.—At the end of five thousand miles of wandering, one was left with a general impression of hopefulness about the future of British farming. Here and there, however, one came across a district

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where the prospect seemed as black, or even blacker, than it has ever been. One such area was the Harborough district of Leicestershire, which depends very largely on the summer feeding of cattle. Another was the corner of Scotland that includes the counties of Nairn, Moray, Banff and Aberdeen. Much of the land here is very good, and the climate, at least along the coastal belt, is very favourable to arable cultivation. The main interests, as in Norfolk, are the winter-fattening of cattle and corn-growing; the district, however, is too far north for any important cultivation of wheat, and the local distillery industry's demand for barley has, until the present season, been extremely poor. Indeed, most of the distilleries have been closed down for years, though some have recently reopened. Sugar-beet has been tried, but, even with intensive manuring on good land, has failed to give a profitable yield.

The principal sale crop in this area has always been oats, which are grown to extraordinary perfection. In good seasons, samples are found running up to 46 lb. and 48 lb. a bushel, and the local sorts, like "Castleton," give a remarkably low proportion of husk. The straw of these varieties is, too, of very high feeding quality, and, along with the excellent turnips and swedes that the district also produces, will nearly, or altogether, fatten bullocks. Even choice baby beeves can be fattened on the roots and straw with no more than 3 lb. or 4 lb. of concentrates. But with oats at 13s. and 14s. a quarter, and good beef at 40s. a hundredweight, the whole system has been crumbling to ruin, and an alternative is hard to find. More breeding and less feeding will, perhaps, reduce the losses on the old feeding farms, but will probably only shift the burden of loss on to the people who have hitherto supplied the stores. Eggs and milk are being produced in greater quantities, but local markets, on account of the depression in the fishing and distilling industries, are not very attractive. Good land, well farmed, yielding two products (milling oats and Aberdeen-Angus beef) that are the choicest of their kind—and the whole business tumbling fast into financial ruin:—that is the plain, unvarnished tale of rural north-east Scotland.*

* Since this was written the import duty on oats has been raised from 20 per cent. *ad valorem* to 3s. per cwt., and new restrictions have been imposed on the importation of fat cattle. These measures may be expected to bring substantial relief to this district.

From Angus to Berwickshire.—There is a considerable change in the arable farming system as soon as one crosses the Highland fault into Strathmore. Wheat becomes commercially possible on most of the land below the 500 ft. contour. There is a local market in the industrial towns for considerable quantities of potatoes. Soft fruit, particularly raspberries and strawberries, thrive exceedingly well. Turnips and swedes produce very heavy crops, of a quality inferior only to that of the district last described. In the low country of Fife and Angus, the traditional arable farming is intensive both in manure and labour: 10 qr. of oats, 8 or 9 tons of potatoes, and 30 tons of swedes per acre represent the kind of crops that are considered satisfactory. The standard arable rotation, until the Great War upset it, was (1) oats; (2) potatoes; (3) wheat; (4) turnips and swedes; (5) barley; (6) and (7) seeds. A 300-acre farm would thus produce about 130 acres of grain, 250 tons of potatoes, and feed fully 150 bullocks in the year, two-thirds in yards in winter and the remainder on grass. In East Lothian, the rotation was made still more intensive by omitting the second year of the seeds, and by selling some hay. Also, a considerable proportion of the root crop was used for fattening tegs.

This system of farming bore the depression of the "nineties" with very fair success. Some of the local farmers went down, but they were replaced by incomers from the south-western part of Scotland, which has, since 1890, provided such an abundant supply of farmers for other districts. Some of these new men brought their milk pails with them; others copied, with quite minor modifications, the traditional methods of their neighbours. During the War years, and up to 1920, very large profits were made. Potatoes in one or two years brought £100 an acre; £20 was not an uncommon return for keeping a fatting bullock for six months; 10 qr. of oats at 70s., or 7 qr. of barley at £6 a qr. made a rent of £2 per acre look foolish.

The past 12 years, however, have had a different tale to tell. A considerable proportion of the potatoes have rotted in the pits for want of a market at any price. Bullocks have, time and again, left less than the cost of the cake they have eaten. Grain has sold, year after year, at a figure far below its cost. As in Pharaoh's dream, the seven lean years consumed the seven good; so that, for the last five, the industry has been living on its own flesh and blood.

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The wheat quota brought the first instalment of relief to this district, and was seized with both hands. The acreage has been raised, in two years, by 55 per cent. The potato scheme is looked to with confident hope of benefit, for, in years of surplus production, markets have got quite out of reach of counties like Fife and Angus. The Government's latest move to drag the beef industry out of the mire is regarded with heartfelt gratitude.

Although farmers throughout this district are a keen and progressive body, it cannot be said that they have discovered any new system that has achieved noteworthy success. It is difficult to be wise, even after the event—unless, indeed, one were to say that the only safe course would have been for the farmer to sell out in 1920 and put his capital into War Loan. Some farmers have laid down land to grass; if they did so early enough they escaped, for a time, some of the heavier losses; but they are very little better off in the end. Some have handed over the risks of potato-growing to merchant growers, taking a small but safe return for their land and labour in exchange for the gamble of producing the crop on their own account. It is difficult to say whether, on the whole, they have been the better or the worse for the change. Many have mechanized up to a point—have displaced two or three horses by a tractor; and, with more satisfactory tools for potato and root cultivation, this movement is likely to go farther. Breeding flocks of sheep have rather markedly increased on the lowland farms, and have almost invariably left a better return for their keep than summer-fattened cattle. Poultry have increased greatly, and, in some years, have been the only department to show a profit; but it would seem that, under present conditions, egg-production has been already overdone. Some increase in fruit-growing would probably be justified, but the capital for such an adventure is rarely available.

It would not be very surprising, given the return of better times, to find the old system, substantially in its pre-war form, re-established. The land cannot be made to produce much more than it did, and no great change in the kind of its produce seems to be called for. More machines and fewer men, more tractors and fewer horses, are the only considerable changes that it would be safe to predict.

NEW METHODS OF SPRAYING FRUIT TREES

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FOR some years it has been apparent that the methods of spraying still in general use, are inadequate to cope with the large amount of spraying now deemed necessary for apples. They fail for two reasons. In the first place they need more care in application than it is possible to give under farm conditions. Secondly, they are so slow that the right time for application has passed long before it has been possible to complete one spraying. Drastic alterations in methods are needed, if success is to be achieved. In devising new methods it is essential to bear in mind the objects to be attained. The object in spraying is to obtain complete cover. It does not matter what kind of spraying is being done, whether of the dormant tree, of the foliage, or of insects, it is always essential to obtain a complete cover. Moreover, it is necessary to complete each spraying in a few days.

The only way of covering the ground more quickly is to use spraying outfits of larger capacity. Fruit growers seem to think that more labour is required. That is a mistaken idea, which is due to their failure to use to the best advantage such power as they already have. It is not uncommon to see a dozen men working with a small outfit, the full capacity of which could be utilized by three or four men. The trouble is caused mainly by the use of toy nozzles.

A man with a tractor and a three-furrow plough can cover more ground than a man with a single-furrow horse plough. The increase in capacity for work depends upon the implement rather than the man. It is just like that with spray nozzles. With a large capacity nozzle, a man can spray more trees than with a small nozzle. The work required is different: it is not harder. In order to use large-capacity nozzles to advantage and without waste, it is necessary to take some pains to understand the best way of going to work.

Kind of Spray.—The different methods of spraying that are adopted affect the quantity of fluid required to obtain complete cover. When using fungicides, it has been cus-

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tomary to insist upon a fine misty spray. Such a spray can only be obtained by using small nozzles, and it is therefore produced in small volume and is lacking in carrying power. Complete cover cannot be obtained with such a spray, unless extreme care is taken to reach each leaf. The close attention required may not be noticed when only a few trees are sprayed, but when it is needed day after day, men find that it is impossible to give it. Either they must hurry and miss large parts of the trees, or they must go slowly to get complete cover—and then they will go on until more fluid is used than is supposed to be necessary. In any event, the work is so extremely slow that it is impossible to do all the spraying at the right time. These are facts that need to be faced, and are sufficient to condemn the use of a genuine fine misty spray.

The only form of spray that is of any practical value for obtaining a complete cover under farm conditions is a *driving spray*. This has many practical advantages. Its penetrating power enables all the leaves, even the dense foliage that clusters round large spurs, to be covered without difficulty. Its carrying power enables any part of the tree to be reached with ease, and enables shorter lances to be used. Further, it abolishes the need for that continual turning and twisting of the lance and poking about among the branches, which is too tiring to be kept up all day and every day. A driving spray can be used in large volume without altering its essential character, thus making it easy to obtain a complete cover, and at the same time speed up the work to an amazing extent. Contrary to the general belief, it is then unnecessary to use any more spray than must be used in any case to obtain complete cover under farm conditions. The only disadvantage is that, except at Long Ashton Research Station, it has not been used for fungicides in experimental work, and the standard formulæ for dangerous chemicals, like Bordeaux mixture, may need modification. During the past six years, however, it has given results that have never been approached by a fine misty spray, under farm conditions. A driving spray is in fact the key to economic spraying.

The larger the volume of spray, the more efficiently and quickly can the work be done, and therefore it is desirable to use the largest volume that the circumstances permit. This makes it necessary to study and improve the conditions that limit the amount a man can handle economically.

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Quantity and Time.—The volume of spray that a man can handle depends upon two factors: the quantity needed to ensure complete cover, and the time required to spray.

The quantity varies greatly and only two rates will be mentioned later—a “light spray” and a “wetting spray.” Many fruit growers insist on so little being used that it is impossible to obtain complete cover with it under farm conditions. In Kent we find that young and active men can get complete cover of the leaves with lime-sulphur with about 250 gal. per acre of a full plant at 200-lb. pressure, or 200 gal. at 400 lb. This is referred to as a “light spray.” This does not result in much drip, but it is important to insist upon complete cover and not to lay too much stress on the absence of drip. Some men cannot do it without considerable drip. Dr. Swarbrick of Long Ashton Research Station has stated (in a paper given at the Imperial Fruit Show and reproduced in the *Fruitgrower*, Nov. 9, 1933) that 350 to 400 gal. at 350 lb. are necessary. This is not the place to go into possible reasons for the difference. If it is necessary to use that amount to obtain complete cover, then it must be used. This quantity is a “wetting spray” and is equivalent to 450 or 500 gal. at 200-lb. pressure. It is also sufficient for spraying with tar oil. Much heavier sprays are sometimes used for special reasons. The point is that the amount that can be handled varies directly with the amount to be put on, and the nozzle volume must be adjusted accordingly.

The time needed when a spray of sufficient volume is used, depends upon the lay-out of the plantation, the equipment, the method of spraying, the pace of the man and the size of the tree. If any one of these factors is unfavourable the time will be increased and the quantity of spray that can be handled will be reduced. It is essential to study these factors carefully, so that the largest possible volume can be used and the work be done with the greatest ease, thoroughness and speed.

Plantation. —If the branches of the trees overlap, or if there are fruit bushes or other crops beneath, a man cannot move so quickly, and cannot therefore use as large a volume of spray. This is but one more argument in favour of adequate spacing of the trees in plantations and orchards. It must not be thought that the system advocated is useless unless the conditions are ideal. It will nearly always be possible to use a larger spray than at present.

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Equipment.—When the large volumes of spray that can be handled are considered, it will be seen that the capacity of most of the 2- to 4-horse power outfits at present in use, is far too small to supply more than one or two good sprays and not always that. It is false economy to set a number of men to work with a small outfit, when two or three can utilize its whole output. Better work will be done with a smaller number, because each can have a larger volume of spray. The capacity of an outfit is given as the number of gallons that can be pumped at a given pressure in a given time. If, however, the working is to be free from trouble, not more than two-thirds of this output ought to be used. It is important to realize that the amount of work done depends upon the size of the outfit and cannot be increased by the addition of extra men.

The working pressure is also important. Experience shows that not less than 400 lb. per sq. in. gives the best results. This pressure saves, roughly, 16 per cent. of time and 25 per cent. of the material needed at 200 lb. This saving will soon pay for the higher cost of the outfit. There is the added advantage that, with tall trees, it causes the spray to carry further and enables short lances to be used. It is impossible to use more than about 3 gal. per minute when the lances are long, because of the back pressure. While good work can be done at 200-lb. pressure, especially on low trees, it will take longer and be more expensive in material.

The present type of relief valve is too slow in operation to be of value in this kind of work. When large volumes of spray are suddenly turned on and off, the difference in the pump output is correspondingly large and sudden. A pressure regulator must be able to cope with this, or trouble is likely to occur.

In order to save time, portable pipes and hoses should be joined by snap fastenings and not by unions that need to be tightened up with a hammer when the loose washer has been lost. When a mobile outfit is used, the tank should be large and a means of filling it quickly should be devised, or much time will be wasted in filling. The length of hose is important and the most suitable length depends upon the method of spraying.

Lances should not be more than 3 ft. long if possible and not more than 5 ft. in any event. This will not give sufficient reach for tall trees unless the pressure is 400 lb. If

tall trees have to be sprayed at a pressure of 200 lb., then long lances are needed and these will limit the volume that can be used to about 3 gal. per min. Sometimes trees are so tall that they cannot be sprayed from the ground without waste of wash. Mr. W. Brice of Higham, Kent, has overcome this difficulty by using a travelling spray tower.

It is of the greatest importance to make a correct choice of nozzles, so that the right type of spray may be supplied in the correct volume to suit the conditions. In favourable conditions the volume that can be used varies from $2\frac{1}{2}$ to 10 gal. per min. The ordinary single nozzle with a $1/16$ th-in. disc aperture, discharges from $\frac{3}{4}$ to $1\frac{1}{4}$ gal. per min., according to pressure. Therefore if a single nozzle is used a wide disc aperture is needed. This will do for low bush trees, but for taller trees, the need for "carry" necessitates the use of a long, narrow spray. It is then better to use a double nozzle, the combination of two long narrow sprays giving reasonable width. The "carry" is limited by the pressure, and if this is not over 200 to 300 lb. per sq. in., 8- or 10-ft. lances will be needed for tall trees, and these limit the volume to about 3 gal. per min. Larger volumes can only be used at this pressure when trees are low. At least 400-lb. pressure is needed to enable really large volumes to be used for tall trees.

An extra long "carry" can only be obtained from a single nozzle when the spray is rather too narrow for comfortable working. A gun enables a spray of medium width to be used for most of the tree, and a very narrow spray is needed only for the tops. A gun, however, needs considerable care in working, or spray will be wasted and parts of the tree missed. The obvious need is for a short lance with a row of nozzles, each giving a long carrying spray and the number giving width. The multi-nozzle lances introduced in the United States a few years ago failed to give sufficient "carry," but a new type put on the market this year may meet requirements.

Methods of Spraying.—Small volumes of spray make it necessary for the man to work all round the tree, walking backwards and forwards, while keeping the lance in constant motion. This is a pure waste of time and effort. A large volume of spray that has sufficient carry, enables the man to reach every part of the tree from the middles of the

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rows and from two sides only. The fact that he has only to walk half the distance enables him to use double the volume of spray.

Rubber hoses of 50 to 60 ft. in length are as long as can be dragged while spraying, and are convenient when small sprays make it necessary to work all round each tree. When large volumes can be used and trees be sprayed thoroughly from two sides, it is better to have hoses double this length, when using underground or portable mains. The operator commences by grasping the hose in the middle and dragging it up between the rows as far as it will go, so that it lies double on the ground. He can then work up one side and back the other, without ever having to drag more than half the length. Hoses attached to a travelling outfit should be short, so that the outfit does most of the dragging, and of uneven lengths, so that the men keep out of each other's way.

Speed of Travel.—This helps to determine the volume of spray that can be used. The time usually taken at present is no guide, because it is impossible to travel faster than the rate of discharge will allow. When this limiting factor has been removed by the provision of an adequate spray, the speed of the man becomes important. In order to use very large volumes, it is necessary to select young and active men for the actual spraying. This should generally be possible as, even on large farms, the number of men required to spray will not be great when large volumes of spray are available.

Still larger volumes of spray can be used, and more rapid work done, if the spray men can ride rather than walk. Travelling at 1 mile per hour enables somewhat larger volumes to be used, and at 2 m.p.h. the volume required would be double that. The practical difficulty then becomes the size of outfit needed to supply such huge volumes, except for small trees.

Size of Tree.—The distance that must be travelled while spraying an acre, varies inversely with the size of the trees. It is twice as great with trees 12 ft. across as it is with trees 24 ft. across. Therefore double the volume can be used on the larger trees, but the same amount of spraying can be done in half the time. It is fortunate that this is so,

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because the larger volume makes it easier to obtain the width and "carry" needed to spray large trees.

Suggestions.—In attempting to improve spraying practice, it is essential to secure the co-operation of the men, but it will be realized that better results are much more dependent upon equipment and management than upon the men. It is true that they will have to walk faster, but they will be relieved of much of the arm work and of the need for watching to see that every leaf is sprayed. When they become accustomed to the possibility of faster work, they certainly prefer it.

If the equipment and management are good enough, it is possible for a man to handle a volume of spray varying from 2 to 3 gal. per min. on trees 12 to 15 ft. across, to 4 or 5 gal. per min. on trees 24 to 30 ft. across, when giving a "light spray." When giving a "wetting spray," a man can handle 4 to 6 gal. per min. on the smaller and 8 to 10 gal. per min. on the larger trees. A few farmers who have studied this matter are using large volumes, but the great majority use about $\frac{1}{2}$ to $1\frac{1}{2}$ gal. per min. If these large volumes are to be used without waste, it is necessary to spray the trees in a fraction of the time, and the possibility of doing this is mainly a question of management.

RAISING THE SOIL TEMPERATURE IN GLASSHOUSES

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A GOOD deal of attention has been focussed recently upon the question of heating soil artificially, of its effect upon plant growth and crop production, and of its application under commercial conditions.

The investigation of these problems was undertaken at the Cheshunt Research Station in 1927, when the electric method, involving the use of buried wires, was tested under conditions that approximate to those of commercial houses.

The cable for the first experiments with tomatoes was kindly supplied by Mr. Olsen, of the Scandinavian Cable Works at Oslo. It consisted of a central resistance wire, insulated and covered in lead. A potential of 240 volts was used, the cables consuming one kilowatt per hour. The wires were laid in ashes at a depth of 16 in. below the surface to enable the soil to be worked to a sufficient depth during the autumn without interfering with the wires. No attempt was made to insulate the warm soil from the colder areas below because of the high cost of placing an insulating layer in position, and also because it would be of doubtful value in view of the large quantity of water used each week during the growing season. There were four plots maintained at temperatures of 65° F., 70° F., 75° F., and 80° F., respectively, from 10 p.m. to 6 a.m. each night during which time the heat was applied. The soil was heated during the first twelve weeks after planting.

After the first ten days, a marked improvement in root development and vegetative growth was observed, the improvement increasing with increased temperature. Weight of crop produced increased similarly, the highest yield being obtained from the hottest plot; but in 1927 and 1928 the percentage increase in crop weight over that from the control plots was only 8 per cent.

1929.—In 1929 it was found that only one wire remained in working order, namely, that in the plot maintained at 80° F.

The results of this experiment are given in Table I.

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TABLE I.

Plot	Temp. in °F	Pounds per plant						Total lb. per plant	Total tons per acre
		May	June	July	Aug.	Sept.	Oct.		
Heated ...	80	0'05	1'72	3'67	0'70	0'99	0'70	7'83	59'50
Control ...	60	0'03	1'31	2'83	0'53	0'90	0'89	6'49	49'33

The sunshine conditions during 1929 were very good and the plants, therefore, were able to take full advantage of the high soil temperature which was realized from March 9 to May 7. The plants in the heated plot quickly showed the effect of increased temperature. After eighteen days they were 4 to 6 in. taller than those on the control plot, the growth being slightly soft and of a light-green colour. The flowers of the first truss opened about a week earlier than those of the control plot. Thirty days after planting, the fruits on plants in the heated plot were about the size of hazel nuts while those on the control plants had barely commenced to swell; but the ripe fruits were picked from both plots on the same day. The above table shows, however, that the fruit on the heated plot matured much faster than that of the control plot, and that the total crop was 20·7 per cent. higher, most of it being obtained before the end of July.

1930.—The cable deteriorated towards the end of 1929, and through the kindness of the British Insulated Cable Company a further supply of cable was provided. This was used in a series of chambers, each being 14 ft. square and fitted with a device for controlling the air temperature. By this means, it was possible to test the effect of raising the soil temperature at two different air temperatures. This time the heated soil was kept at a temperature of 68-69° F.

Table II shows the results of the experiments measured in weight of crop taken to the end of July.

The crop increases that resulted from the higher soil temperatures are not so great as those that have since been obtained, because it was not possible to raise the temperature more than 4° or 5° F. above the control; but the results show that the fruit on the heated plots 2 and 5 matured earlier than on the control plots 3 and 4. The greatest increase; approximately 33 per cent., occurred when the air

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TABLE II.

Chamb. No.	Air Temp.	Average Variation	Mean Soil Temp.	May : lb. per plant	June : lb. per plant	July : lb. per plant	Total lb. per plant to end July	Tons per acre
2	65	2.5	69.1	0.61	2.48	0.65	3.74	28.42
3	65	1.1	64.6	0.68	1.64	0.59	2.81	21.35
4	60	4.0	62.6	0.13	1.87	0.94	2.94	22.34
5	60	3.8	68.1	0.27	1.91	0.91	3.09	23.48

temperature was 65° F., which is about the optimum temperature for glasshouse tomatoes.

1931.—In 1931, the experiments were extended to cucumbers, a cable presented by Mr. Jacobsen, of Akers, Norway, being used.

The results were distinctly promising, for an increase in crop production amounting to 50 per cent. was recorded for the first six weeks of picking as a result of raising the soil temperature by 15° F. At this point, the heating was stopped and crop production fell to the same level as the control plot. Heating was recommenced late in the season, and the yield immediately increased. At the end of the season the plants on the heated plot were the only healthy plants in the houses. The results are given in Table III.

TABLE III.

Plot	Soil Temperature	Pounds per plant								Total tons per acre
		Mar.	April	May	June	July	Aug.	Sept.	Total	
E5	Control 75° F.	1'53	8'13	10'88	8'07	9'84	4'36	0'81	43'62	65'43
E6	Heated 90° F.	4'33	8'50	8'96	9'11	9'88	6'80	3'30	50'88	76'32

1932.— This experiment was repeated in 1932 and other plots were introduced. The capital outlay for heating cables amounts to about £500 per acre for tomatoes and about half this value for cucumbers; moreover the cables require to be replaced at frequent intervals. With cucumbers, the wires are laid immediately below the beds, which are renewed each year; hence the wires have to be

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lifted to enable the base, or soil beneath the beds, to be dug during the autumn. It is by no means easy to take up the wires and relay them without injury.

General.—The problem that presented itself was to find a cheap wire to replace the costly cable; one that could be taken up from the cucumber houses at the end of each season. Mr. Bennett and Mr. Shotter of the North Metropolitan Electric Supply Company, who had been watching these experiments with great interest, helped materially in this respect, and experiments were devised in which the soil was heated by means of a cheap galvanized steel wire through which a low-voltage current passed.

For tomato houses, a thick wire, made by twisting seven strands of galvanized steel wire, 14 S.W.G., was employed. It heated the soil satisfactorily and showed no signs of corrosion after three years.

For cucumbers, 9 strands of galvanized steel wire, 14 S.W.G., were connected to two copper-bar conductors, so that the strands were 1 in. apart. The wires were laid on the surface of the soil, pulled tightly by means of straining posts, and the cucumber beds were placed upon them. They were heated by passing through them a current at approximately 10 volts.

The capital cost is reduced greatly by this method, for, although transformers are necessary, they will last for many years, and the cost of the wire, which, for cucumbers, has to be replaced each year, is only a few pounds per acre.

This system was used in the cucumber experiments for two years, and proved satisfactory. The results of these experiments showed that, when soil sterilization is not practised, a crop increase of some 33 per cent. can be obtained by raising the temperature of the bed to approximately 90° F. Soil sterilization, in itself, will increase the weight of crop produced, and heating the beds in this case has given an increase of only 10 per cent.

The summarizing of these results has indicated that the temperature of the soil in the glasshouses of this country is lower than is desirable, and that improvement in plant growth and crop production may be obtained by increasing it.

In the heated soil, root development has been rapid, and the roots have been comparatively free from disease. Vegetative growth has been accelerated, but the plants have

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been rendered slightly softer, the softness increasing with increased wetness and with the nitrogen content of the soil. With cucumbers, fruit production has been hastened and the crop increased. With tomatoes, the flowers have set freely, and a greater weight of early crop and of total crop have been obtained.

The question of cost, however, must be taken into account, and with the unit of electricity at its present price, the electric heating of the soil for tomato work is apparently too costly for commercial purposes.

On an average tomato soil, about 5 watts per sq. ft. are required to raise the temperature 6° F. (from 66° F. to 72° F.). This, at $\frac{1}{3}d.$ per unit amounted to £4.10 per acre for four months. With the cucumber, which is at present a more valuable crop than the tomato, it is possible that the increase may show some profit after deducting the cost of heating the beds by electricity.

Although the present cost of electricity prevents it from being used for heating tomato soils, its flexibility and ease of control give it many advantages over other methods; and, where cost is of secondary importance, private owners of greenhouses may find it useful.

In horticultural research work, where it is necessary to maintain a quantity of soil at a certain constant temperature, the electric method is particularly useful.

At Cheshunt, the following plan has been adopted. A wooden box, 3 ft. wide, 4 ft. 6 in. long and 3 ft. deep, was placed inside another box sufficiently large to allow a 3-in. air space between the two, and so prevent too rapid loss of heat. A 6-in. layer of ashes was placed on the bottom, and on this rested a wooden frame, across which was fastened a length of galvanized steel wire in zigzag fashion. Both ends of the wire were brought to the top for connexion to a thermostat and the electric supply. A depth of about 18 in. of light soil was placed on top of the frame and the box was filled up with peat. Plants, in ordinary clay pots, were plunged in the peat. The buried wires were heated by passing a current at about 10 volts through them, and it was an easy matter to maintain the soil in the pots at any desired temperature when the heat was regulated by a soil thermostat placed in one pot. This device can easily be adapted for the purpose of heating propagation benches.

Although the electric method proved too expensive for commercial tomato work, it had shown the advantages that

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are to be obtained from soil heating, and an attempt was made to devise some cheaper method.

In 1930, Messrs. Richard Crittall & Company, Ltd., very kindly offered to instal suitable apparatus for this purpose, and two plots, each 25 ft. long by 6 ft. wide, were set apart for an experiment. Half-inch pipes, in loop formation, were buried 15 in. below the surface and connected to the ordinary hot-water pipes in the house, so that the hot water from a flow pipe was circulated through the buried pipes and picked up by a return pipe. An electrically driven pump was used for this purpose. The soil became heated quickly and the two plots were maintained at 78° F. and 84° F. respectively. It is interesting to note that the soil near the pump remained at a temperature of 100° F. for nearly four weeks, without injuring the plants, although the fruit was noticeably soft in this area. Table IV shows the weight of fruit obtained and the mean weekly temperatures of the soil. Two adjoining plots in the same house were used as controls.

TABLE IV.

Plot	Temp. °F	Pounds per plant			lb. per plant at at end of July	Total tons per acre at end of year
		May	June	July		
3	62	0·02	1·20	1·96	3·18	44·32
4	84	0·14	2·15	2·14	4·43	52·13
5	78	0·08	2·46	2·01	4·55	53·80
6	62	0·08	2·03	1·53	3·64	42·71

From the above table it will be seen that the plants at a soil temperature of 84° F. showed a crop increase of 30 per cent. to the end of July and 19·1 per cent. for the whole season over the average of the control plots 3 and 6; and that those at a soil temperature of 78° F. gave a 33·4 per cent. increase by the end of July and a 23·6 per cent. increase for the whole season.

The soil temperature of 84° F. was obviously too high, for the fruit was on the soft side, especially during the early part of the season. The fruit from the plot at the lower temperature was of good quality. The experiment was repeated in 1932 with similar results.

In 1933, the hot-water experiments were continued on a larger scale. A plot of land, 100 ft. by 6 ft., being one

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side of a tomato house, was heated by underground pipes, the other side remaining unheated as a control. As in the previous experiment, the hot water was taken from the heating system of the house and forced by means of an electric pump through pipes buried one foot below the soil surface. Galvanized iron pipes, 1 in. in diameter, were used for the purpose. These were placed 18 in. apart, along the length of the bed, being joined together in loop formation, so that the hot water could circulate freely through the system. The pump was fitted with a starting device actuated by a soil thermostat, which regulated the circulation of hot water in the pipes in accordance with the soil temperature. The thermostat was set at 80° F. and, when the soil temperature reached this figure, the pump was cut out and circulation ceased. A drop in soil temperature caused the pump to come into action again.

This system has one important disadvantage, connected with the temperature of the water in the ordinary hot-water pipes during the day. It is customary to maintain a good boiler temperature during the night and give less heat during the day, and this means that the hot water available for circulating in the pipes is sufficiently hot only during the night. Actually the only periods during which the pump was cut out occurred at night, the soil temperature being lower than 80° F. during the day.

Despite this fact, however, a soil temperature of 80° F. was maintained at night, the day temperature being approximately 5° F. lower.

Having found, during the previous year, that a substantial increase in crop could be obtained by heating the soil by means of buried hot-water pipes, it seemed desirable to determine whether a high soil temperature was essential during the first weeks; therefore, in the present experiment, the soil was not heated until three weeks after planting. Later a temperature of 80° F. was maintained. The results given in Table V show quite clearly that early heating is necessary, because whereas previously the increase in crop yield as the result of heating the soil was observed in May and June, in the present experiment it did not show until July, but by the end of August the increase was about 22 per cent.

In another tomato house, the soil was heated by burying a system of 2-in. hot-water pipes connected to a separate boiler. The pipes were laid on the gravity system, and

RAISING SOIL TEMPERATURE IN GLASSHOUSES

TABLE V.

Treatment	Average weight of crop in lb. per plant				
	May	June	July	August	Total to Aug. 31
Heated ...	0·09	1·85	3·94	1·42	7·29
Unheated ...	0·07	1·77	2·94	1·19	5·97

were 20 in. below the surface at the north end of the house and 14 in. deep at the south end. On the west side of the house, there were 4 pipes, 18 in. apart, and on the east side there were 3 pipes, 2 ft. 6 in. apart.

It was difficult to maintain a uniform soil temperature because control had to be applied at the boiler, but, as far as could be determined, the soil temperature on the east side was approximately 80-85° F., and on the west side, 70-75° F.

Table VI gives the results calculated to the end of August:—

TABLE VI.

Crop weight in lb. per plant to August 31				
Average of three plots 70-75° F. ...	...	...	...	4·82
" " " 80-85° F. ...	...	...	...	5·99
Average of plots in adjoining house unheated 60-70° F.				4·65

This house is 11 years old and has never been sterilized. Last year, it produced an average yield of 4·72 lb. per plant for the whole season, whereas the adjoining house, used as the control in the above experiment, produced 6·59 lb. per plant. The yield was so low, and the plants so poor, that it was clear that the soil should have been sterilized.

The effect of heating the soil is greater therefore than would appear from the above figures, for whereas the crop-yield last year was about two-thirds of that from the adjoining house, it is now more than 30 per cent. above it.

The result suggests that soil-heating may replace soil-sterilization to some extent.

The results of the seven years' experiments have shown very clearly that, when the soil temperature is raised to 80° F., during the first three months of the season there is

RAISING SOIL TEMPERATURE IN GLASSHOUSES

a definite improvement in the tomato crop. Root-development is greater, and the roots are cleaner than in soil at ordinary temperatures. Vegetative growth is more vigorous and the plants remain green and healthy beyond the time at which they are usually removed. The first box of fruit is not usually picked earlier, but the main crop ripens more quickly and a greater weight is picked during the first month. With cucumbers, heavier and earlier crops have been obtained.

Much of the root trouble, which has made soil-sterilization so necessary, is the result of unsuitable physical and chemical conditions. These appear to be overcome by increasing the soil temperature. On the other hand, some diseases would not be affected, while eelworm attack, which thrives under hot dry conditions, might be expected to become more serious. The work has passed the experimental stages, and, as the results obtained are so striking, it is hoped that some nurserymen will test the process on a small scale.

The necessary apparatus includes (1) a hot-water boiler for providing water at a temperature of about 140° F.; (2) an electric pump with starting device controlled by a soil thermostat; and (3) a quantity of one-inch pipe. The pipe, which should be specially treated to prolong its life in the soil, should be buried 2 ft. below the surface in tomato houses and placed so that the lengths are 2 ft. apart, although future experiment may show that this distance can be increased to 3 ft.

By burying the pipes 2 ft. deep, provision is made for digging without interference, and it appears to be an advantage to place the pipes at this depth rather than nearer the surface.

The estimated cost of the apparatus is as follows:—

(a) 1 Acre of Glasshouses.

	£	s.	d.
Cost of boiler	90	0	0
„ pump and motor	35	0	0
„ pipes and fittings	325	0	0
	<hr/>		
	£450	0	0

(b) $\frac{1}{2}$ acre of Glasshouses.

	£	s.	d.
Cost of boiler	52	0	0
„ pump and motor	20	16	0
„ pipes and fittings	187	4	0
	<hr/>		
	£260	0	0

RAISING SOIL TEMPERATURE IN GLASSHOUSES

(c) $\frac{1}{4}$ acre of Glasshouses.

	<i>£</i>	<i>s.</i>	<i>d.</i>
Cost of boiler	33	0	0
„ pump and motor	13	0	0
„ pipes and fittings	119	0	0
	<hr/> £165 0 0 <hr/>		

The pump should be thermostatically controlled, and a hot-water storage tank should be arranged in circulation with the flow and return mains to prevent overheating of the boiler when the thermostatic control stops the pump.

It is suggested that, for tomatoes, a soil temperature of 70-73° F. should be maintained from planting time until the first truss of fruit has started to swell, about which time the temperature should be increased to 80° F. No additional benefit to tomatoes has been noticed when heating is continued beyond the twelfth week after planting.

The greatest benefit would be expected on cold heavy soils, and while no experiments have been made with light soils, they may not respond so well on account of the necessity for more frequent watering. At Cheshunt, a soil temperature of 80° F. has not caused undue vegetative growth or softness of fruit, but those who consider testing this method might be wise not to exceed a soil temperature of 75° F. at first.

Advice on this subject will be given gladly if application is made to the writer at the Experimental and Research Station, Cheshunt, Herts.

ACKNOWLEDGMENTS.—Grateful thanks are due to all who have helped in the above experiments either by providing apparatus or giving advice. Among these may be mentioned Mr. Olsen, of the Scandinavian Cable Works at Oslo, Mr. Jacobsen, of Akers, Norway, Mr. A. H. Bennett and Mr. Shotter, of the North Metropolitan Electric Supply Co., Mr. L. J. Fowler, of Richard Crittall & Co., Ltd., Mr. W. Hopkins, of The Thames Bank Iron Co., and Mr. W. Read and Mr. O. B. Orchard, of the Experimental Station, for their assistance in conducting the experiments and making records.

MARKETING NOTES

Potato Marketing Scheme, 1933.—The Potato Marketing Board report a good response to the invitations that were sent out to over 100,000 producers in Great Britain to apply for registration under the scheme. Producers who had registered on or before January 17 received voting papers for the initial poll. Voting closed on February 1 and it is expected that the result will be declared on February 5. Numerous meetings of potato growers throughout England, Wales and Scotland were addressed by the Chairman and members of the Board.

Milk Marketing Scheme, 1933.—The Milk Marketing Board announce that the manufacturing price in respect of milk manufactured into cheese and butter has been fixed at $3\frac{1}{2}d.$ per gallon for January. The price for December was $3\frac{3}{4}d.$

Complaints of delay experienced by some milk producers in receiving payment for milk supplied are still reaching the Board's offices. The Board have already pointed out that, in many instances, the delay is the fault of the producers themselves in not rendering invoices (or monthly returns) promptly. Invoices for January deliveries, duly verified by buyers, should be returned to the Board not later than February 7. Producer-retailers are asked to send their January returns to the Board not later than February 3.

The regional pool prices and rates of producer-retailers' contribution for December, 1933, are given below. Corresponding figures for October and November are given for comparison.

Region.	Regional Pool Price.			Producer-Retailers Contribution.		
	Pence per gallon.			Pence per gallon.		
	Oct. d.	Nov. d.	Dec. d.	Oct. d.	Nov. d.	Dec. d.
Northern ..	$13\frac{3}{4}$	14	$14\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{3}{8}$
North-western ..	$13\frac{1}{2}$	14	14	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{3}{8}$
Eastern ..	14	$14\frac{1}{2}$	$14\frac{3}{4}$	1	$1\frac{9}{16}$	$1\frac{9}{16}$
East Midland ..	$13\frac{1}{2}$	$14\frac{1}{4}$	$14\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{9}{16}$	$1\frac{9}{16}$
West Midland ..	$12\frac{3}{4}$	$13\frac{1}{2}$	14	$1\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{3}{8}$
North Wales ..	$13\frac{1}{4}$	$13\frac{3}{4}$	14	$1\frac{9}{16}$	$1\frac{9}{16}$	$1\frac{3}{8}$
South Wales ..	$13\frac{1}{2}$	$13\frac{3}{4}$	14	$1\frac{3}{8}$	$1\frac{9}{16}$	$1\frac{3}{8}$
Southern ..	14	$14\frac{1}{2}$	$14\frac{3}{4}$	1	$1\frac{9}{16}$	$1\frac{9}{16}$
Mid-western ..	$12\frac{3}{4}$	$13\frac{1}{4}$	$14\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{9}{16}$	$1\frac{9}{16}$
Far-western ..	$13\frac{1}{4}$	$13\frac{1}{2}$	$13\frac{3}{4}$	$1\frac{9}{16}$	$2\frac{1}{8}$	$1\frac{9}{16}$
South-eastern ..	$14\frac{1}{2}$	$14\frac{1}{2}$	$15\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{9}{16}$

MARKETING NOTES

Prices and contract terms for the next contract period, beginning April 1, are now being considered by the Board in consultation with the purchasers' representatives, as provided by the scheme. During the first year of the operation of the scheme, the Board are also required, before making any determination in relation to wholesale prices, or terms affecting prices, to consult with the three persons, appointed by the Minister for the purpose, who are empowered, in the event of disagreement between the Board and the purchasers' representatives, to fix the prices.

The Board announce that Mr. C. Whittome, of Brundon Hall, Sudbury, Suffolk, has paid the fine of £50 imposed upon him by the Board on November 17 last for selling milk below the retail price prevailing in the district concerned.

The Board also announce that the following amendment has been made to the prescribed form of contract M.C. 33/2:—

Second Schedule, paragraph 4— add:—

“and (d) the Board is satisfied that during the same month the purchaser purchased not less than a daily average of five hundred gallons of milk.”

The Board add that this amendment has been made after consultation and in agreement with the persons referred to in paragraphs 57 and 60 of the Scheme.

Pigs and Bacon Marketing Schemes.—The difficulties experienced by some curers during November in taking deliveries of the pigs then coming forward had largely disappeared by the end of December, by which time the surplus held up during October had been disposed of, either to the pork market or as deliveries under contracts, including group contracts. It is anticipated by both Boards that every pig contracted for will be required for delivery from now onwards until the expiration of the initial contract period on February 28.

The present members of the Pigs Marketing Board go out of office on March 31. They will be succeeded by a Board consisting of 8 “district members.” and 3 “special members.” Meetings of registered producers are being held in each of the 8 districts in February, for the purpose of electing the district members. Special members will be elected by the registered producers in general meeting, to be held later in the month.

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Regulation of Supplies: Processed Milks.—In the December issue of this JOURNAL (pp. 857-8) reference was made to negotiations for a continuance of regulation of imports of condensed whole milk, condensed skimmed milk, milk powder and cream into the United Kingdom during the four months September-December, 1933, and a statement was given of imports of these products during (a) the three months June-August, 1933, and (b) the month of September, 1933, with comparable import figures during 1932.

The final arrangements for the seven months June-December, 1933, provided for the limitation of imports of condensed whole milk, condensed skimmed milk, milk powder and cream into the United Kingdom from the principal foreign supplying countries to 80 per cent. of the quantities sent in the corresponding months of 1932, except that, for the month of December, the limitation on imports of condensed skimmed milk from the countries concerned, namely, the Netherlands and Denmark, was fixed at 85 per cent. Foreign countries with smaller interests in the market, together with the Dominions, other than the Irish Free State, were asked to agree to a standstill in respect of their shipments during the seven months as compared with the corresponding months of 1932.

The following statement shows the quantities of processed milks imported into the United Kingdom from foreign and Empire sources during the seven months June-December, 1933, with comparable figures for 1932:—

<i>Product.</i>	<i>Source.</i>	<i>June-December,</i>	
		1932. <i>cwt.</i>	1933. <i>cwt.</i>
Condensed Skimmed Milk	Foreign Countries	1,176,421	943,031
	Empire ..	39,892	53,946
	Total ..	1,216,313	996,997
Condensed Whole Milk (Sweetened and Unsweetened)	Foreign Countries	264,984	199,685
	Empire ..	102,513	92,562
	Total ..	367,497	292,247
Milk Powder (Unsweetened)	Foreign Countries	86,308	47,321
	Empire ..	97,841	120,082
	Total ..	184,149	167,403
Cream	Foreign Countries	36,583	31,028
	Empire*	41,367	38,815
	Total ..	77,950	69,843

* Excluding imports across the land boundary into Northern Ireland from the Irish Free State.

MARKETING NOTES

The figures for the earlier months of the regulation period necessarily include shipments that were already in transit at the time when the agreements were made, as, for example, the comparatively heavy shipments of milk powder that arrived from New Zealand in June and July.

Negotiations are in hand for the regulation of imports during the first quarter of 1934. The position with regard to imports after March has been referred to the Market Supply Committee for advice.

Potatoes.—In the October and December issues of this JOURNAL (pp. 642-3 and pp. 858-9 respectively) were given details of arrangements that had been made for the regulation of imports of potatoes into the United Kingdom from foreign countries and the Irish Free State during the four months September-December, 1933.

Actual imports during these four months from the Netherlands and Belgium, as well as from the Irish Free State, were smaller than the permitted imports, while imports from other countries were negligible. Figures are as follows:—

<i>Source.</i>	<i>Imports: Sept.-Dec., 1933.</i>		<i>Authorized Maximum Figure of Imports: Sept.-Dec., 1933.</i>	
	(tons.)		(tons.)	
Netherlands	6,266	.. ..	8,000	
Belgium	53	.. ..	250	
Irish Free State	3,520	.. ..	4,500 (a)	
Other Countries	98 (b)	.. ..	—
Total ..	<u>9,937</u>		<u>12,750</u>	

(a) Exclusive of (i) seed potatoes and (ii) small consignments, not exceeding one ton, exported to Northern Ireland in farmers' own carts.

(b) Largely early potatoes from the Channel Islands, the Canary Islands, and the Azores.

The position with regard to the regulation of imports of potatoes after December 31, 1933, was referred to the Market Supply Committee for advice. Following upon the Committee's recommendations, arrangements are being made for the regulation of imports of maincrop potatoes into the United Kingdom during the four months January-April, 1934; the position with regard to the regulation of imports of early potatoes in the 1934 season is under consideration.

MARKETING NOTES

Consumers' Committee for England.—The Committee met on January 5. The product under consideration was milk, and the Committee directed their attention to questions relating to retail prices.

Committee of Investigation for England.—The Committee met on January 3 to consider a complaint made by the Brewers' Society against the operation of the Hops Marketing Scheme, 1932. The Committee decided to give the Hops Marketing Board and the Brewers' Society an opportunity of appearing before them to submit evidence at the Committee's meeting on January 15 and 16. The Brewers' Society appeared by Sir Reginald Mitchell Banks, K.C., M.P., who called five witnesses; the Board appeared by Mr. L. C. Graham-Dixon, who called three witnesses.

The Committee presented their report to the Minister on January 19.

Committee of Investigation for Great Britain.—The Committee met on January 16 to consider complaints by the Parliamentary Committee of the Co-operative Congress and the Live Stock Officers' Association against the operation of the Pigs Marketing Scheme, 1933. The Committee fixed January 23 as the date by which the Pigs Marketing Board were entitled to submit representations in writing.

Production of Home-Grown Beet Sugar.—The total quantity of beet sugar manufactured during December, 1933, was 2,338,246 cwt. The total production from the opening of the campaign until the end of December was 7,874,981 cwt. By the middle of January, this total had increased to 8,613,700 cwt., establishing a record figure for output of beet sugar in this country. The previous highest figure was 8,486,000 cwt. in the manufacturing season 1930-31. Most of the factories continued working in January, but two had ceased operations by the end of December.

An article on the financial position of the Beet Sugar Factory Companies will be found on page 1068 of this issue.

Wheat Act, 1932: Sales of Home-grown Wheat—Cereal Year, 1933-34.—Certificates lodged with the Wheat Commission, covering wheat sales from the commencement of the cereal year on August 1, 1933, up to and including January 13, 1934, indicated sales of 15,928,951 cwt of millable wheat.

MARKETING NOTES

Second Advance Payment to Registered Growers.—The Wheat Commission have decided to make a second payment in advance to registered growers on account of deficiency payments that will become due under the Wheat Act for the cereal year ending July 31, 1934. This advance will be made in respect of all proper applications received from registered growers on valid wheat certificates which were delivered to the Wheat Commission after October 28, 1933, and on or before January 19, 1934.

The payment, which will be made on or about Saturday, February 17, 1934, will be at the same rate as that made in November last, namely, 3s. per cwt., equal to 13s. 6d. per quarter of 504 lb.

It should be clearly understood that the proposed payment is not a further advance in respect of wheat for which an advance has already been made.

The Wheat Commission hope to make two further advance payments on account during the course of the current cereal year, at dates that will be announced in due course.

Technical Committee on Design of Factory-Abattoirs.

—The Minister of Agriculture and Fisheries, acting upon the suggestion of the Reorganization Commission for Fat Stock, has appointed a Committee to consider and report on the technical requirements, as regards output, structure, lay-out and equipment, of factory-abattoirs in the light of modern practice at home and abroad in the processing and handling of meat, offals and by-products.

The composition of the Committee is as follows:—Sir Francis T. Boys, K.B.E. (Chairman), Sir Richard J. Allison, C.B.E., F.R.I.B.A., Mr. A. I. Eastwood, Mr. J. Hobson, Mr. Sidney C. Willis and Alderman William Wright, J.P. The Secretary is Mr. W. H. Wilkin of the Ministry of Agriculture and Fisheries.

Communications for the Committee should be addressed to the Secretary at 3, Sanctuary Buildings, Great Smith Street, Westminster, London, S.W.1.

National Mark Beef.—The number of sides (including quarters and pieces expressed in terms of sides) of beef graded and marked with the National Mark during October, November and December, 1932 and 1933, and the three weeks ended January 20, 1934, were as follows:—

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LONDON AREA.

	<i>London.</i>	<i>Birkenhead.</i>	<i>Scotland.*</i>	<i>Total London Supplies.</i>
Oct., 1932 ..	6,945	5,208	4,350	16,503
" 1933 ..	6,717	4,529	5,178	16,424
Nov., 1932 ..	7,334	5,902	4,554	17,790
" 1933 ..	6,507	4,008	4,615	15,130
Dec., 1932 ..	8,016	5,132	5,317	18,485
" 1933 ..	6,901	3,997	5,800	16,698
Three weeks ended				
Jan. 20, 1934	4,039	2,131	4,278	10,448

* Figures include Scotch sides graded and marked in London.

BIRMINGHAM AND YORKSHIRE AREAS.

	<i>Birmingham.</i>	<i>Leeds.</i>	<i>Bradford.</i>	<i>Halifax.</i>
Oct., 1932 ..	4,770	2,242	2,021	492
" 1933 ..	5,186	2,440	2,050	606
Nov., 1932 ..	5,201	2,319	1,789	456
" 1933 ..	5,337	2,233	1,641	429
Dec., 1932 ..	5,117	1,846	1,400	362
" 1933 ..	5,100	1,891	1,389	399
Three weeks ended				
Jan. 20, 1934	3,544	1,415	1,099	288

The sides dealt with in the three months ended December 31, 1933, fell into the following grades:—

	<i>Select.</i>	<i>Prime.</i>	<i>Good.</i>
London	6,346	13,605	174
Birkenhead ..	3,031	9,503	—
Scotland	12,179	3,414	—
Total London Supplies	21,556	26,522	174
Birmingham ..	7,569	7,156	898
Leeds	1,187	5,247	130
Bradford	1,017	3,909	154
Halifax	197	1,012	225

From time to time representations from various interests have been made to the Ministry that the area of operation of the National Mark Beef scheme at the Birkenhead centre should be extended to include Liverpool. More recently a resolution to this effect was adopted at a meeting of the Live Stock Committee of the National Farmers' Union.

This proposal has now been adopted under arrangements that came into operation on January 15, 1934. In common with other National Mark Beef centres, the Birkenhead centre (including Liverpool) has facilities for dealing with consignments of all classes of live stock forwarded for sale by grade and dead-weight.

Copies of Marketing Leaflets 27, 46, and 63 dealing with these schemes can be had on application to the Ministry.

National Mark Vegetables.—The National Mark Scheme for cauliflower and broccoli is now nearing the completion of its first year of operation. The scheme has

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aroused considerable interest and already 88 growers have been authorized to pack under the Mark. Despite the somewhat unfavourable weather conditions in 1933, some 700,000 heads of cauliflower and broccoli were packed under the scheme.

The grades introduced in March, 1933, were of an experimental nature, and did not, for example, permit of cauliflower and broccoli with curds of less than $4\frac{1}{4}$ in. in diameter being packed under the National Mark. A demand for supplies of a smaller size has since become apparent, and, as much of the produce imported during June falls within the limits $3\frac{3}{4}$ to $4\frac{1}{4}$ in. in diameter, the Ministry, with the concurrence of the National Mark Vegetables Trade Committee, has decided to permit the packing of cauliflower of this size-range under the National Mark, from May 15 to July 15 in each year under the designation "Selected Summer Cauliflower."

The non-returnable collapsible crate with vertical side pieces has also been approved for use under the scheme. This package is widely used in Kent, and it is hoped that the approval of this container will encourage producers in that area to pack their supplies under the National Mark.

At the annual Western Commercial Horticultural Spring Show, which is being held at Penzance on March 15-16, the special class for National Mark broccoli, inaugurated last year, is being repeated, and the Ministry is again providing the prizes.

National Mark Cheshire Cheese.—158 members of the Cheshire Cheese Federation have been authorized to apply the National Mark to their farm-made Cheshire Cheese, and over 140 of these makers are applying National Mark labels to Cheshire Cheese graded in accordance with the provisions of the Agricultural Produce (Grading and Marking) (Cheshire Cheese) Regulations, 1933. The number of farm cheeses graded up to the end of January was:—

<i>Extra Selected.</i>	<i>Selected.</i>	<i>Total.</i>
10,678	4,253	14,931.

1,089 factory-made Cheshire Cheeses weighing 34,337 lb. have also been graded and marked at the factories of the two manufacturers who have been authorized in the scheme.

Proposed National Mark Schemes for other Types of Cheese.—The Trade Advisory Committee recommended at its recent meeting that investigations in regard to the

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marketing of Cheddar and Wensleydale Cheese should be continued with the object of promulgating National Mark grades for these cheeses during 1934.

Displays of National Mark and other Home Products.—The National Mark and Home Industries Exhibition, held in the Civic Hall, Exeter, and organized by the Ministry as part of the activities of the Exeter "National Mark Week," January 22-27, was officially opened by the Permanent Secretary of the Ministry, Sir Charles Howell Thomas, K.C.B., K.C.M.G., in the presence of the Mayor and other prominent citizens and county residents. The Ministry's own stand, comprising a display of all National Mark products in season, formed an imposing central feature of the exhibition. Twelve registered National Mark packers representing various commodities had stands of their own, including a working National Mark Egg Testing and Grading Demonstration. Cookery demonstrations with National Mark products were given by the Exeter Electricity and Gas Undertakings, and the remainder of the stands were occupied by national firms and local industries. The activities have aroused considerable interest in the National Mark Schemes, and it is hoped that the movement has received a permanent stimulus in this important centre.

Irish Free State: The Bacon and Pigs (Regulation of Export) Order, 1933.—The September, 1933, number of this JOURNAL contained a note (see pp. 551-3) on the Interim Report of the Pig Industries Tribunal appointed by the Government of the Irish Free State. In accordance with the recommendations of this Tribunal, the Agricultural Products (Regulation of Export) Act, 1933, was passed for the purpose of regulating and controlling the export of agricultural products to any country that establishes a system of regulation or control of the import of such agricultural products.

The regulation of imports into the United Kingdom of bacon, and live pigs and pig carcasses for conversion into bacon, in connexion with the Bacon Marketing Scheme, involves the control of exports of these products from the Irish Free State. An Order—the Bacon and Pigs (Regulation of Export) Order, 1933—has now been made by the Irish Free State Minister for Agriculture under the above-mentioned Act setting up machinery for the complementary

regulation of exports to the United Kingdom. The Order provides for the separate registration of exporters of (a) bacon (including hams), (b) live pigs for conversion into bacon, and (c) pig carcasses for conversion into bacon, and for the allotment between them of the respective quotas for these products in each quota period fixed by separate Order under the Act. Registered exporters are under a statutory obligation to export the amount of their allocations. If they fail to do so in any quota period, the Minister for Agriculture may reduce their allotment in every subsequent period. The Minister also has power to cancel the registration of an exporter who exports less than 95 per cent. of his allocation in any quota period.

Each registered exporter is supplied with export permits of convenient denominations to the amount of his allocation, and with consignment certificates in triplicate form. Permits covering a consignment, together with a completed consignment certificate, must be delivered at the time and place of exportation to the Customs authorities, who countersign and forward one section of the consignment certificate (with cancelled permits) to the Department of Agriculture, Dublin; one to the Bacon Marketing Board, the Ministry of Agriculture and Fisheries, London, or to the Ministry of Agriculture, Belfast, as the case may be, and the third with the consignment to which it relates.

It is not lawful under the Order for any person to export to Great Britain or Northern Ireland any bacon or live pigs or pig carcasses intended for conversion into bacon, unless such person is a registered exporter and has delivered to the Customs authorities export permits to the appropriate amount and a consignment certificate duly completed.

The Order revokes the Pig Carcasses (Regulation of Export) Order, 1933, relating to the export of pig carcasses for conversion into bacon in Northern Ireland.

The quantities of bacon, live pigs and pig carcasses intended for curing, that may be exported to the United Kingdom will be the subject of separate Orders from time to time. Thus, the Bacon and Pigs (Quota) (No. 1) Order, 1933, was made for the month of January, 1934, under which 25,500 cwt. of bacon, 1,818 pigs, and 6,000 cwt. of pig carcasses were available for allotment to registered exporters.

MARKETING NOTES

Pig Industry Act, 1933, Queensland, Australia.—The Pig Industry Act of 1933 makes some important provisions for regulating pig production and marketing in Queensland.

In addition to regulations aimed at checking the spread of disease, the Act prescribes methods of grading and marking pigs and pig products. Pigs purchased over the scales, and pigs consigned direct to factories, must be marked in such a way as to ensure identification of the vendors and consignors. Detailed records of all transactions in pigs must be kept by auctioneers, agents, dealers, factories and butchers. Factories must not pay, directly or indirectly, for any carcass or part thereof that has been condemned as unfit for human consumption. Factories must grade the carcasses of all pigs received, and if and when required by regulation under the Act, must pay differential prices for the various grades. Provision is also made for the application, by Government inspectors, of quality-marks to pork carcasses and bacon sides.

Canadian Bacon Grading Regulations.—The Ottawa Agreement with Canada guarantees to that Dominion free entry into the United Kingdom for Canadian bacon of good quality up to a maximum of 2½ million cwt. per annum. Great importance is attached by H.M. Government in this country to the maintenance of a satisfactory standard of quality by Canadian exporters in view of the fact that any increase in Canadian bacon exports to the United Kingdom necessitates a corresponding reduction in supplies of established reputation from foreign sources.

An Order in Council recently issued by the Canadian Government under the Livestock and Livestock Products Act, 1927, governing the grading, marking and sale of bacon for export to Great Britain, has an important bearing on this question. It empowers the Canadian Minister of Agriculture to license the export of bacon to the United Kingdom conditionally on the exporter conforming to regulations regarding, *inter alia*, the method of grading and packing bacon, and the marking of both the bacon and the package. Three grades are to be prescribed, but the details of the grades remain to be settled.

BEET SUGAR INDUSTRY IN GREAT BRITAIN

FINANCIAL POSITION OF THE FACTORY COMPANIES

THIS article reviews the financial position of the beet sugar factories as at March 31, 1933, and the trading results of the 1932-3 manufacturing campaign. It supplements the information given on the subject in the "Report on the Sugar-Beet Industry at Home and Abroad"* and continued in the February, 1932, and March, 1933, issues of the JOURNAL in respect of the 1930-1 and 1931-2 campaigns respectively. There are 15 companies, in all representing 18 factories, but one of these factories did not operate in the beet sugar campaign under review.

Table I (see Table 67 of the Sugar-Beet Report) gives a summary of the combined balance sheets of all the companies and shows their financial position as at March 31, 1933. Figures for the previous year are shown for comparison.

Reserves and credit balances on Profit and Loss Account amounted to £1,723,638, of which £237,993 was appropriated to payment of dividends, leaving £1,485,645 to be carried forward. The latter figure is equivalent to over 22 per cent. of the total share and loan capital. It will, however, be noted that there is included in this figure a sum of £183,297, representing advances received under the British Sugar Industry (Assistance) Act, 1931, which are contingently repayable. The amount paid in dividends, £237,993, was 5·4 per cent. of the aggregate share capital as against £194,125 and 4·4 per cent. in the previous year and £411,562 and 8·8 per cent. in 1930-1.

The position in regard to expenditure to March 31, 1933, on plant, machinery and equipment is as follows:—

Total expenditure	..	..	..	£	8,791,548
Less: Depreciation	..	..	..	3,265,952	
Written off on reconstruction	..	..	..	153,288	
					<u>3,419,240</u>
Balance as per Table I	..	..	..		<u>£5,372,308</u>

* Economic Series No. 27: H.M. Stationery Office, 1931 (price 6d. net, post free 1s.).

BEET SUGAR INDUSTRY IN GREAT BRITAIN

TABLE I.—SUMMARY OF BALANCE SHEETS OF BRITISH BEET SUGAR FACTORY COMPANIES AS AT MARCH 31, 1932 AND 1933.*

	As at March 31		Increase or decrease
	1932	1933*	
	£	£	£
<i>Liabilities.</i>			
Share Capital ...	4,445,954	4,445,954	—
Mortgages and Debentures...	1,545,951	1,479,536	— 66,415
Bank and other Loans ...	902,050	821,901	— 80,149
Sundry Creditors and out-standings ...	722,573	736,859	+ 14,286
Reserves† ...	1,447,717	1,392,555	— 55,162
Profit and Loss Balances before appropriation of dividends, less deficits ...	402,060‡	331,083	— 70,977
Total Liabilities £	9,466,305	9,207,888	— 258,417
<i>Assets.</i>			
Beet sugar factories and equipment, less depreciation	5,632,172	5,372,308	— 259,864
Investments ...	820,462	815,287	— 5,175
Stocks and Stores...	1,960,294	1,896,353	— 63,941
Sundry Debtors and Pre-payments ...	601,066	538,055	— 63,011
Cash Balances ...	452,311	585,885	+ 133,574
Total Assets £	9,466,305	9,207,888	— 258,417

* Including the Balance Sheet of the factory that did not operate in the 1932-3 beet sugar manufacturing campaign.

† Including capital reserves; also special reserves amounting to £318,689 in 1932 and £183,297 in 1933, of which in both years £183,297 represents advances under the British Sugar Industry (Assistance) Act, 1931, which are contingently repayable. The special reserves for 1932 included also £115,069 provision for contingent losses on forward contracts. The actual losses amounted to £105,570 met by appropriating £104,641 from the sum set aside together with £929 charged against the 1933 Trading Account. The balance of £10,428 not required was transferred to General Reserves.

‡ Including £65,727 appropriated from general reserves for the payment of dividends.

Investments amounted to £815,287, of which £733,829 was invested in associated companies, as against £820,462 and £733,534 in 1931-2 and £836,722 and £749,655 in 1930-1.

The capital cost per ton of beet worked in the factories during the 1932-3 campaign was £3.9 as against £5.3 in the previous season and £2.8 in 1930-1. The tonnage of beet worked was 2,232,061 tons as against 1,667,288§ tons

§ Revised figure.

BEET SUGAR INDUSTRY IN GREAT BRITAIN

in 1931-2 and 3,060,498 tons in 1930-1. The average daily tonnage of beet worked in 1932-3 was 27,901 tons as compared with 26,051 tons in the previous year and 27,572 tons in 1930-1. The corresponding daily rated capacities were, respectively,* 25,350 tons, 25,450 tons, and 24,200 tons. The output of sugar, expressed in terms of commercial white sugar, was 324,563 tons as against 246,432 tons in 1931-2 and 417,940 tons in 1930-1. The manufacturing campaign was of 80 days' duration compared with 64 days in 1931-2 and 111 days in 1930-1.

Table II (see Table 70 and Appendix F. of the Sugar-Beet Report) has been compiled from data supplied by the factories and shows the total manufacturing costs and charges under the various main subheads of expenditure together with the corresponding costs per ton of beet worked. The total cost per ton of beet was 2s. 7d. less than the figure for 1931-2 and 2s. 8d. less than that for 1930-1.

TABLE II.—MANUFACTURING COSTS AND OVERHEAD CHARGES OF BRITISH BEET SUGAR FACTORIES FOR THE YEARS 1931-1932 AND 1932-1933. TOTAL AND PER TON OF BEET WORKED.

	1931-2		1932-3		Increase or decrease per ton of beet
	Total	Per ton of beet	Total	Per ton of beet	
	£	s. d.	£	s. d.	s. d.
Coal and coke ...	239,108	2 10	296,721	2 8	- 0 2
Limestone ...	48,230	0 7	58,910	0 6	- 0 1
Bags ...	90,328	1 1	119,062	1 1	...
Other manufacturing supplies ...	85,151	1 0	73,951	0 8	- 0 4
Repairs and main- tenance ...	108,285	1 4	101,240	0 11	- 0 5
Salaries and wages ...	502,797	6 0	534,310	4 9	- 1 3
Rates and insurance	50,621	0 7	44,308	0 5	- 0 2
Other general charges	75,325	0 11	75,273	0 8	- 0 3
Beet expenses ...	94,110	1 2	143,165	1 3	+ 0 1
Totals ...	1,293,955	15 6	1,444,940	12 11	- 2 7

Table III (see Appendices F and G and Table 91 of the Sugar-Beet Report) gives a summary of the trading and profit and loss accounts for the financial year ended March 31, 1933 (1932-33 campaign), with comparative figures for the preceding financial year (1931-32 campaign). The total income from products, after deducting Excise Duty on sugar but before adding subsidy, was £4,482,495

* Excluding the factory which did not operate (capacity 1,000 tons per day).

BEET SUGAR INDUSTRY IN GREAT BRITAIN

TABLE III.—BRITISH BEET SUGAR FACTORY INCOME, EXPENDITURE AND PROFITS FOR THE YEARS ENDED MARCH 31, 1932 AND 1933. TOTALS OF ALL FACTORIES AND AVERAGES PER TON OF BEET WORKED.*

	Total		Per ton of beet	
	1931-2	1932-3†	1931-2	1932-3
<i>Income, expenditure and profits.</i>	£	£	s. d.	s. d.
Net income from sugar (less excise duty)	2,871,415	3,792,488	34 5	34 0
Molasses	31,740	94,510	0 5	0 10
Pulp	389,825	594,558	4 8	5 4
Lime sludge	840	939	—	—
Total income from saleable products	3,293,820	4,482,495	39 6	40 2
Add subsidy	†1,791,792	2,579,345	21 6	21 4
Total income	5,085,612	6,861,840	61 0	61 6
Less cost of beets	3,529,093	4,761,730	42 4 (69%)	42 8 (69%)
Balance to factories	1,556,519	2,100,110	18 8 (31%)	18 10 (31%)
Less manufacturing costs and overhead charges	1,293,955	1,444,940	15 6	12 11
Trading profit	262,564	655,170	3 2	5 11
Profit on subsidiary industries	67,011	(loss) 28,061	0 9§	0 3
Total profit	329,575	627,109	3 11§	5 8
<i>Appropriation of profit.</i>				
Interest charges||	70,286	97,193	0 10§	0 10
Directors' fees	22,702	25,806	0 3	0 3
Depreciation	195,972	279,242	2 4	2 6
Income Tax	37,441	37,555	0 6§	0 4
Dividends... ..	194,125	237,993	2 4§	2 2
Reserves	15,627	108,850	0 2	1 0
Other appropriations¶	56,922	3,569	0 8	—
Total appropriations	593,075	790,208	7 1§	7 1
Less—				
Transfer from reserves	97,389	48,254	3 2§	1 5
Amounts taken from credit balances as at March 31, 1931 and 1932... ..	166,111	114,845	—	—
Trading profit as above	329,575	627,109	3 11	5 8

* The figures are based on the confidential trading and profit and loss accounts of all the companies.

† Including, where applicable, figures of the factory that did not operate in the 1932-3 beet sugar manufacturing campaign.

‡ Excludes advances under the British Sugar Industry (Assistance) Act, 1931; these, being contingently repayable, are not regarded as income but as a liability. (See Summary of Balance Sheets, Table I.)

§ Revised figure.

|| After deduction of income from investments.

¶ Depreciation of Stocks, etc., 1931-2.

BEET SUGAR INDUSTRY IN GREAT BRITAIN

or 40s. 2d. per ton of beet, compared with £3,293,820 or 39s. 6d. per ton in 1931-2 and £5,245,396 or 34s. 4d. in 1930-1. With regard to the subsidiary industries, there was a net loss for all factories of £28,061 as against profits of £67,011 and £132,915 in the two previous years. The total profit, including subsidy and profit on subsidiary industries, less cost of beets, manufacturing expenses and overhead charges, was 5s. 8d. per ton of beet as against 3s. 11d. in 1931-2 and 9s. 10d. in 1930-1.

The total appropriations exceeded the total profit by £163,099, and to meet the deficiency thus created £114,845 was taken from credit balances as at March 31, 1932, and £48,254 was transferred from reserves. In relation to the total capital employed, the amount distributed in dividends and interest, less interest received from investments, was 5.0 per cent.; the amount applied to writing down the fixed assets was 4.1 per cent., and the amount placed to reserve was 1.6 per cent.

AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1933*

PRODUCE OF CROPS

THE areas returned in June, 1933, as under wheat, beans, peas, potatoes and mangolds were larger than those returned under the same crops in 1932. The areas under barley, oats, mixed corn and turnips and swedes were smaller. The total area from which a crop of hay was taken in 1933 was smaller than the area in 1932, the acreage under meadow hay being greater than in the previous year and that under seeds hay smaller.

With the exception of beans, hay, mangolds and turnips and swedes, yields were higher than in 1932, but only in the case of wheat, peas and potatoes is the total production in England and Wales estimated to be greater. The estimated production of wheat is greater by 42 per cent. than last year and that of peas and potatoes by 17 per cent. and 5 per cent. respectively.

The estimated yield of peas is 0.2 cwt. per acre below the ten years' average. With this exception, the estimated yields of the corn crops are higher than the average yields of the past ten years. Of the other crops referred to above, the yield per acre of potatoes only is above the ten years' average.

Corn Crops: *Wheat*.—At 1,660,360 acres, the acreage under wheat in England and Wales in 1933 was greater by 29 per cent. than the acreage in 1932 and the estimated yield per acre over the whole country is 19.0 cwt. compared with 17.2 cwt. in the latter year. The net result is that the total production of wheat is estimated to be 31,476,000 cwt., or 9,385,000 cwt. more than last year, an increase equivalent to 42 per cent. Throughout the country yields were generally higher than the local ten years' averages, the average yield of wheat for the whole country being 1.7 cwt. per acre above the ten years' average, while in the Eastern and South-Western divisions yields were higher by as much as 2.7 cwt. and 1.9 cwt. per acre respectively.

* This return was published on December 20, 1933.

AGRICULTURAL RETURNS, 1933

PRELIMINARY STATEMENT SHOWING THE ESTIMATED TOTAL PRODUCE AND YIELD PER ACRE OF THE CORN, HAY AND ROOT CROPS IN ENGLAND AND WALES IN 1933, WITH COMPARISONS FOR 1932, AND THE AVERAGE YIELD PER ACRE OF THE TEN YEARS 1923-32.

Crops	Estimated Total Produce		Acreage		Estimated Yield per Acre		
	1933	1932	1933	1932	1933	1932	Average of the ten years, 1923-1932
	Thou- sands of Cwt.	Thou- sands of Cwt.	Acres	Acres	Cwt.	Cwt.	Cwt.
Wheat ..	31,476	22,091	1,660,360	1,287,908	19.0	17.2	17.3
Barley ..	12,624	15,342	751,345	960,530	16.8	16.0	15.8
Oats ..	24,517	25,018	1,494,498	1,580,010	16.4	15.8	15.3
Mixed Corn ..	1,696	1,841	103,975	113,640	16.3	16.2	15.3
Beans ..	2,353	2,363	139,112	138,555	16.9	17.1	16.7
Peas ..	1,048	893	72,657	65,767	14.4	13.6	14.6
	Thou- sands of tons	Thou- sands of tons					
Seeds Hay*	1,551	2,177	1,261,009	1,538,265	24.6	28.3	28.7
Meadow Hay† ..	4,131	4,658	4,603,765	4,542,497	17.9	20.5	20.7
Potatoes ..	3,478	3,308	518,934	504,275	6.7	6.6	6.2
Turnips and Swedes ..	5,951	7,542	553,406	578,047	10.8	13.0	12.6
Mangolds ..	4,137	4,336	237,319	229,164	17.4	18.9	18.9

* Hay from Clover, Sainfoin and Grasses under rotation.

† Hay from Permanent Grass.

Barley.—There were 209,185 acres less under barley than in 1932, a decrease of 22 per cent. The estimated increase of 0.8 cwt. in the average yield per acre was not sufficient to counterbalance the decrease in acreage, and the estimated total production of 12,624,000 cwt. is, therefore, 2,718,000 cwt. below the figure for 1932, a decline of 18 per cent. The estimated average yield of 16.8 cwt. per acre for the whole country is 1 cwt. per acre above the ten years' average. In England, yields for the various counties are consistently above the ten years' averages, the greatest divisional increase being that of 2 cwt. per acre in the Eastern division. The improvement in the yield over the ten years' average was less pronounced in Wales.

Oats.—At 16.4 cwt. per acre, the estimated average yield of oats shows a slightly smaller increase over the 1932 yield than in the case of barley, but the decrease in acreage was less marked, being only 5 per cent. or 85,512 acres, and the

AGRICULTURAL RETURNS, 1933

total estimated production of oats of 24,517,000 cwt. is consequently only 501,000 cwt. or 2 per cent. less than in 1932. Yields above the ten years' average were obtained in practically every county, the greatest improvement being evident in the South-Western division, where the divisional yield was 1.8 cwt. per acre above the divisional average. The estimated yield for the whole country is 1.1 cwt. above the average for the past ten years.

Mixed Corn.—The area under mixed corn was smaller by 9 per cent. than in 1932, and the estimated average yield of 16.3 cwt., although 1 cwt. above the average of the past ten years, is only 0.1 cwt. per acre above that of last year. The total production for the whole country is estimated at 1,696,000 cwt. compared with 1,841,000 cwt. in 1932, a decrease of 8 per cent.

Beans.—The average yield of beans is 0.2 cwt. per acre below the yield of last year but is higher than the ten years' average by a like amount. The area harvested as corn, 139,112 acres, was, however, greater by 0.4 per cent. than the corresponding area in 1932, and the total production of beans harvested as corn, which is estimated at 2,353,000 cwt., is only 0.4 per cent., or 10,000 cwt., smaller than last year. In only three divisions of the country was the average yield below the ten years' average for the division.

Peas.—Whilst the estimated yield of peas harvested as corn is 0.2 cwt. per acre below the ten years' average it is greater by 0.8 cwt. per acre than the yield in 1932. The area harvested as corn was also greater by 10 per cent. than last year and the total estimated production of 1,048,000 cwt. of peas harvested as corn is consequently as much as 17 per cent. or 155,000 cwt. greater than in 1932. In the West of England and Wales yields were generally above the local ten years' averages.

Hay.—Although the continued hot and dry weather was not favourable for the growth of grass the weather conditions enabled the hay crop to be secured at an earlier date than usual and in excellent condition.

Seeds Hay.—The yield of seeds hay is 4.1 cwt. per acre below the ten years' average and 3.7 cwt. per acre below

AGRICULTURAL RETURNS, 1933

the yield last year. The crop was taken from an area smaller by 277,256 acres or 18 per cent. and the estimated total production of 1,551,000 tons is 626,000 or 29 per cent. below that of 1932. The smaller yield was general and most marked in the Eastern and North-Eastern divisions, where the average yields were as much as 6 cwt. and 6.6 cwt. per acre respectively below the divisional ten years' averages.

Meadow Hay.—Meadow hay was taken from an area greater by 1 per cent. or 61,268 acres than in 1932 but the yield was 2.6 cwt. per acre below that of last year, and the estimated total production is 4,131,000 tons compared with 4,658,000 tons in 1932, a decrease of 11 per cent. compared with that of 29 per cent. in the case of seeds hay. The yield per acre over the whole country is estimated at 17.9 cwt., or 2.8 cwt. per acre below the ten years' average. Smaller yields than average were general, and the yield was most markedly below the ten years' average in the West Midland division, where the difference amounted to 4.3 cwt. per acre.

Potatoes.—The area under potatoes, which had increased during the previous two years, was further increased in 1933, when the area under the crop was greater by 14,659 acres or 3 per cent. than in 1932. The yield was 0.1 ton per acre higher than in the previous year and 0.5 ton per acre above the ten years' average. The total production is estimated at 3,478,000 tons or 5 per cent. above that in 1932 and 469,000 tons above the average production of the past ten years. Only in the North-Western division were yields generally below the divisional ten years' average; over the remainder of the country yields were generally above the county ten years' averages.

Roots: Turnips and Swedes.—The yield of turnips and swedes is 2.2 tons per acre below the yield in 1932 and 1.8 tons per acre below the average yield of the past ten years. The area from which the crop was taken showed a decrease of 4 per cent. or 24,641 acres as compared with the previous year, and the total production of 5,951,000 tons is estimated to be 1,591,000 tons below that of 1932, a decrease of 21 per cent. The average total production of the past ten years has been 9,194,000 tons. In only two

AGRICULTURAL RETURNS, 1933

counties were yields above the ten years' average of the county.

Mangolds.—Although at 237,319 acres the area under mangolds was greater by 4 per cent. than in 1932, the estimated yield is smaller by 1.5 tons per acre and the estimated total production of 4,137,000 tons is lower by 199,000 tons or 5 per cent. than the total production in 1932 and 1,884,000 tons below the average production of the past ten years. Yields were not so generally below average as in the case of turnips and swedes but the average yield for the whole country was 1.5 tons per acre below the average of the past ten years.

Sugar Beet.—The area of 363,990 acres under sugar beet was greater by 43 per cent. than the acreage in 1932 and the yield of washed and topped beets is estimated at 8.2 tons per acre or 0.5 ton per acre below that of 1932. It is anticipated that the total production of washed and topped beets will not fall far short of 3 million tons.

FEBRUARY ON THE FARM

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It is a sound object of efficient farm management to distribute the labour requirements in such a manner that there are few idle days. As far as arable interests are concerned, however, there is a certain linking of labour with the months from March to October. February, however, is a very suitable month in which to consider the spring sowing programme, and to determine suitable crops and areas. In recent years there have been notable deviations from the time-honoured rotational methods of cropping. Thus there is a greater flexibility in cropping, which is largely determined by the preconceived prospects for the crops in question. This is the basis of cropping for profit as distinct from cropping according to tradition or custom. There is always an element of uncertainty in forecasting the prospects of particular crops, but instinct and market indications may prove helpful.

Though cropping for convenience as distinct from cropping according to tradition is held to be sound economics, it has in no sense weakened the academic position of rotational cropping. Perhaps the outstanding feature of a good rotation is the law and order associated with the management of the land, a feature that deserves to be more widely appreciated. The determination of a suitable rotation of crops is no simple matter. Full consideration must be given to such points as the needs of the live stock at different periods of the year, the suitability of the soil and climate for particular crops, and the market demand for selling-off crops. In considering the economics of crop production, it was a common experience in past years to find that cereals, for example, yielded the profit through the straw, especially on mixed farms. This was not always so obvious on farms where straw is available in excess of the needs of live stock. Similarly, the total profit derived from sugar beet is dependent upon the use made of the crown and tops. Facts of this kind tend to emphasize the true relationship between arable and live stock interests on the average mixed farm.

FEBRUARY ON THE FARM

It is sometimes difficult to decide when it is cheaper to grow food for live stock than to buy equivalents. It is significant that the intensification of farming has created problems that did not exist years ago. There is a growing body of opinion that many diseases of live stock, for example, could be more effectively controlled if greater reliance were placed on suitable home-grown foods. Other problems tend to complicate this very debatable subject, and in particular the question of land becoming "sick" of certain classes of live stock. An arable policy that favours long grass leys is probably ideal under existing conditions of farming, and particularly valuable in the continuous provision of fresh pastures for live stock. The maintenance of healthy conditions when land is under permanent grass is traditionally supposed to be influenced by applications of lime. The response to lime in terms of live-weight increases with live stock that are grazed on lime-treated plots has often been disappointing. It is significant, however, that stock-breeders of note place great faith in lime, believing that it promotes a healthier type of herbage. In the light of modern knowledge concerning the mineral composition of farm foods and the part they play in successful nutrition, this confidence is probably justified.

Arable Operations.—February can often be regarded as a suitable month for tillage operations. Thus it is one of the driest months of the year, and particularly so in the East Midlands. Frost is occasionally troublesome, but we have to go back to 1929 for a really serious stoppage of farm work. In that year winter oats suffered considerable mortality, and seedings of spring corn were much delayed. The dry, open weather experienced this winter has materially aided ploughing, so that arable work is well advanced.

The dry state of the subsoil has also been particularly suitable for subsoiling, which is always worth attention where a hard pan exists below the normal level of ploughing. It is probably difficult to find regular arable land that is not subject to pan formation, especially on the medium soils. The penetration of this hard layer by a suitable subsoiling tine not only aerates the soil to a greater depth, but frequently facilitates drainage. This does not necessarily mean that subsoiled land is more apt to dry out in a drought, for the increased rooting area available invariably

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means a more drought-resisting crop. This was particularly observable during the drought of last summer.

Cross-ploughing is probably the outstanding cultural operation associated with February, particularly on land intended for roots. There is at present a very real temptation to economize in cultivations, and to attempt to maintain cropping output by the use of artificial fertilizers. It is necessary to remind ourselves more frequently that plant foods are only one link in the chain of successful crop production. The more complete stirring and aeration of the soil resulting from cross-ploughing is usually reflected in improved cropping results, probably derived from increased activity on the part of soil organisms. The depth of furrow turned is largely determined by the depth of true soil. Suggestions are sometimes made that the depth of ploughing has no material influence on the resulting crop, although good practice usually determines that the maximum depth of furrow should be turned for roots.

February Seedings.—Common observation indicates that different districts tend to have different fixed seeding dates. There is a general tendency among progressive agriculturists, however, to sow as early as possible. It is impossible to lay down hard-and-fast rules on this important subject. Local soil and climatic conditions are always more important than any fixed date, but as far as the usual spring-sown crops are concerned, the accumulated evidence definitely favours early seeding. Discretion must naturally be exercised, for it is useless to bury seed in sodden and cold ground. Experience quickly enables one to determine when the state of tilth is suitable for the reception of seed.

Oats are probably one of the most important crops that deserve attention in this respect. If the soil conditions are suitable at the time of seeding, February and early March sowings almost invariably give heavier yields than later sowings. Various indirect reasons account for this superiority. Thus, early-sown crops tend to be less affected with frit fly and other pests, while early sowing frequently leads to the crop becoming successfully established well in advance of competing weeds, which are largely suppressed. The part played by a growing crop in the control of the weed population of the soil is a most important one. Early-sown oats invariably stand up to heavy harrowing if this is necessary

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for weed eradication, but the smother action is also effective.

The varieties of oats now grown are considerably fewer than formerly. The trials that are being conducted under the direction of the National Institute of Agricultural Botany are serving a valuable purpose in eliminating the least productive strains and focussing attention upon the most productive varieties. For February seedings, Marvellous is probably one of the most popular oats in cultivation. This oat in a mild winter will yield satisfactory results from autumn sowings, but in most instances reliance is placed on February sowings. Marvellous is a heavy yielder of both grain and straw from early sowings, and its stoutness of straw makes it particularly suitable for very rich soils. In a great measure this latter quality makes it a great favourite in the Midlands. Victory is another oat that has acquired a high reputation in all parts of the country, and is regarded generally as the most "fool-proof" of all varieties at present in cultivation. Its reliable yielding capacity, coupled with its high quality of grain and medium growth of straw that is reasonably resistant to lodging, give a distinction that has made the variety one of the standard sorts. The extent to which oats are grown for sale has very much declined in recent years, and in general the crop is grown for home consumption. In these circumstances it is desirable to grow the greatest weight of grain possible. An oat that answers this requirement is Golden Rain II, a variety that, like Victory, was raised at the Svalöf seed-testing station in Sweden. Over a number of years, the trials of the National Institute of Agricultural Botany have indicated the marked superiority of Golden Rain II in most parts of the country. The grain is yellow in colour, while the straw has fairly good standing properties. Maturity is early and there is no variety that is more deserving of a trial than this. The objection that is sometimes raised to the colour is purely sentimental and has no bearing on the feeding quality, for there is no sound reason why yellow oats should not command just as much money on the market as white oats.

Pea, Vetch and Oat Mixtures.—The dry summer and the burnt-out pastures of 1933 once again served to emphasize the value of crops that can serve a variety of purposes. Legume and cereal mixtures that can be used green

for soiling purposes or ensilage, or may be cured into hay, are particularly useful as stand-by crops, and it is advisable under most mixed farming conditions to devote some attention to this form of cropping. Even if no special provision is made, it is often possible to find odd corners and the headlands of fields that can be utilized. This latter course could be more generally followed on fields bordering overgrown hedges or woodland, where corn dries slowly and some crops grow but poorly. Further, as the material is ready for use before harvest, the headlands of corn fields are cleared for the self-binder at the commencement of harvest. This form of cropping is also useful on land that is apt to be dirty, since it is cleared sufficiently early to allow effective pin fallowing to follow the crop. It is sometimes believed that smother crops effectively control weeds. This is true up to a point. In practice it is found that serious weed trouble is controlled, and that subsequent cleaning operations are more effective by reason of the weaker state of the weed population.

A very frequent cause of relatively poor results from legume-cereal mixtures is the mistaken idea that these mixtures will thrive under any condition of fertility without particular need for direct treatment. This is, of course, not the fact, for soiling crops are like most others in demanding proper conditions of soil fertility. When this aspect is attended to, it is usually found that weed control is even more effective as a result of the smother effect.

The seed mixtures employed vary according to the particular use to which the crop is to be put. Thus for hay, a combination of 2 bushels of oats to 1 bushel of peas is a usual seeding. Under conditions where more liberal seed rates are desirable, this rate can be increased. Maple peas are normally employed, while forage varieties of oats claim superiority over the ordinary large-grain bearing varieties. For silage and soiling the addition of 1 bushel of vetches is an asset. February is a particularly suitable month for the commencement of seedings of this crop.

Grass Land and General.—February is a suitable month for carrying out cultural treatment on grass land, since growth of grass is usually at a minimum. On normal land, grass harrowing is extensively practised for the purpose of spreading droppings. If it were not for the fact that soiling of the herbage would be objectionable when fields

FEBRUARY ON THE FARM

are stocked during winter, it would be good practice to chain harrow in autumn as well as towards the end of winter, with the special object of avoiding unduly tufted herbage in the following grazing season. Manurial applications can also be suitably made, while dressings of nitrogenous fertilizers at this stage do much to promote an early bite during the next few weeks. Where stocks of fodder are running low as a result of the heavy consumption during last summer and autumn, this course may be highly desirable for both sheep and cattle.

The laying up of grass fields that are to be cut for hay should receive attention. In eastern and southern England it is customary to get the best response in terms of hay when fields are freed from stock right from the beginning of the growing season. This is particularly true of permanent grass land. It is possible to continue to graze meadow land until April, and to stimulate the grass land by applications of nitrogen. This, however, is only successful when the rainfall during May is sufficient to foster maximum growth. Normal experience indicates that it is never safe to count upon a heavy rainfall in May.

The repairing and laying of hedges is another operation that claims attention in the first three months of the year. Laying or plashing is a fine art that is responsible for the perpetuation of stock-proof hedges. The mutilation that is caused in many parts of the country as a result of the chopping off of existing hedges is always regrettable, for in many cases potentially good hedges have been destroyed beyond repair.

NOTES ON MANURING

J. HUNTER SMITH, B.Sc., H. W. GARDNER, B.A., and
C. E. HUDSON, N.D.H.

Herts Institute of Agriculture, St. Albans.

Depressing Effect of Taking an Early Bite on the Subsequent Growth.—In the January notes an illustration was given of the increased growth of grass obtainable in spring when temperature is favourable, by the application of nitrogenous fertilizers in February. There is, however, one aspect of taking an "early bite" that needs to be taken into account if the full cost of the practice is to be estimated, and that is the severe check given to the grass by eating it off closely so soon after it has commenced its period of rapid growth: this, of course, applies whether nitrogen has been used or otherwise.

During the course of co-operative experiments in the Cambridge Advisory Province over a period of several years, the more recent results of which will be published shortly, the depression of the June hay crop due to taking a small bite about April 10 has been fairly accurately measured. The figures obtained at one of the centres ("Oaklands") will be sufficient to indicate the extent of the depression.

Plots No Treatment	1		2		3	
	No Early Bite No S. Ammonia		Early Bite No S. Ammonia		Early Bite 1 cwt. S. Amm. in February	
	1932	1933	1932	1933	1932	1933
Early April yield of dry matter, cwt. per acre	—	—	1.15	3.30	2.69	4.32
June Hay crop, dry matter, cwt. per acre	35.5	30.07	28.35	22.00	30.40	24.45
Total to June (inclusive)	35.5	30.07	29.50	25.30	33.09	28.77
Average two years (cwt.)	32.78		27.40		30.93	
Depression compared with 1 (cwt.)			5.38		1.85	

By comparing Plots 1 and 2 it will be seen that the effect of taking a small early bite in April was to reduce the June hay crop by over 7 cwt. in 1932 and 8 cwt. in 1933, or, when the early bite is added in, by 5.38 cwt. as the average for the two years. By comparing 1 and 3 it will be seen that the use of 1 cwt. sulphate of ammonia fails, by the

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extent of 1.85 cwt., to make good this deficiency. While it would be a mistake to place a great deal of emphasis on this effect without going into the question of quality as well as quantity of produce and the relative money value of early bite and hay, yet it is clear that there is a definite debit item to be placed against early bite.

The Use of Compound Fertilizers.—During the past four months great emphasis has been placed in these notes on two aspects of the subject of manuring—first, the very unimportant part artificials play on the average farm, and second, the unsatisfactory position in which the adviser finds himself, through the absence of accurate methods of soil analysis and the shortage of reliable field experiments on the various crops on the many different soils of the country. Nevertheless, there is sufficient experimental evidence to justify the adviser in asserting that the farmer ought, on economic grounds, to supplement farmyard manure with much larger quantities of artificial fertilizers. What, then, is the best line of advance from an admittedly backward position.

Just two years ago the matter was carefully reviewed for the county of Hertfordshire, and the line decided on will undoubtedly be of interest in other parts of the country, though unanimous approval is not anticipated—nor is it maintained to be necessarily the best solution elsewhere. The diagnosis of the situation was as follows:—

- (1) Very little expenditure on artificials.
- (2) Apart from those at Rothamsted comparatively few field experiments had been carried out on Hertfordshire soils, but the available ones pointed to the importance of potash.
- (3) Exceptionally great soil variation not only between fields but even within small fields.
- (4) Artificials had commonly been given a bad name because of the use of single nutrient manures, e.g., nitrate of soda.
- (5) The balance sheet of addition and removal of plant nutrients during the typical four- or five-course rotation suggests—in addition to dung—the use of a fertilizer containing nitrogen, phosphate and a rather high proportion of potash.
- (6) The first step forward should always be a simple but yet a reasonably correct one—not a complicated though ideally correct one.

NOTES ON MANURING

It was therefore decided to adopt the course of recommending farmers who had not already a well-established system of manuring, to use a single complete fertilizer for most of the crops on the farm. The mixture decided on was:—

5 parts	Sulphate of Ammonia
9 „	Superphosphate
4 „	Muriate of Potash
2 „	Steamed Bone Flour,

having approximately the analysis—

5 per cent.	Nitrogen
6 „	Soluble Phosphoric Acid
3 „	Insoluble „ „
10 „	Potash.

Since 25 per cent. of the mixture consists of sulphate of ammonia, i.e., 4 cwt. contain 1 cwt., it is easy, by thinking in terms of sulphate of ammonia, to make recommendations for the different crops. The following, taking from a leaflet issued by the Institute to advocate the mixture, shows the actual advice given:—

Cereals (Wheat, Barley, Oats).

	Amount of the mixture per acre
(a) After clover or beans or dung on land in good heart	nil
(b) After seeds, or on land in moderate heart ...	2-3 cwt.
(c) For second or third straw crop, and for all land in poor heart	4 cwt.

Mangolds, Kale,* Cabbage.**

(a) With dung; also for <i>Swedes</i> without dung	2-4 cwt.
(b) Without dung	4-6 cwt.

Potatoes, Sugar Beet, Brussels Sprouts.**

(a) With dung	4-8 cwt.
(b) Without dung	6-10 cwt.

“Seeds,” Temporary Leys and Meadow Hay.

In years when dung is not applied	2-4 cwt.
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Permanent Pasture.

Occasional dressings when slag or dung is not used	2-4 cwt.
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Note 1. Beans, clover and other leguminous crops require mainly phosphates and potash.

Permanent pasture requires mainly phosphates and potash, but for an “early bite” may be given a spring dressing of 2-4 cwt. of the mixture.

Note 2. Good cultivation is all important. Well-cultivated land always gives the best returns from manuring.

* Crops marked thus may be given a top-dressing of nitrogenous manure in addition, e.g., 1 cwt. Nitrate of Soda or Nitrate of Lime.

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Note 3. For spring-sown crops the mixture may be applied to the seed bed; for autumn-sown crops it may be given as a top-dressing in the spring.

It has not been deemed necessary to adhere strictly to a single mixture, and obviously any farmer who makes a trial of the compound with encouraging results will not be long in taking the next very simple step which brings him to a "three-manure system."

1. A suitable complete fertilizer for most of the crops. This will be selected in the light of the information available for his district.
2. A potassic phosphate (e.g., potassic slag, or potassic mineral phosphate, or potassic super) to be used for autumn treatment of grass land and for beans or clover. The selection will again be determined by local knowledge.
3. A nitrogenous fertilizer, for spring top-dressing, e.g., for early bite on grass and autumn-sown cereals.

Such a "three-manure system" would enable any farmer to get as near to economic perfection as is possible with our present imperfect knowledge of soil and crop requirements.

Concentrated Complete Fertilizers.—The high analysis fertilizers that originated in Germany under the name of "Nitrophoska" mixtures, and are now made, with suitable modifications, in this country, have been widely tested during the past few years, and except in a few instances that are the subject of further investigation, have proved themselves equal to mixtures made up from well-known constituents such as sulphate of ammonia, superphosphate and muriate of potash.

Six or seven of these compounds are now available, covering a sufficiently wide range of variation in the ratio nitrogen:phosphoric acid:potash to make a suitable choice possible for most crops and for most soils. They afford an easy method of carrying out the suggestions made above. Both when buying and using them it must not be forgotten that their content of plant food is about double that in the ordinary compound fertilizer.

Manuring of Market Garden Crops.—For these crops the shortage of trustworthy evidence is far greater than for those of the farm, though it is hoped that the experiments now proceeding or shortly to be started, in different parts of the country, will do something in the course of a few years to make good this serious deficiency. Meanwhile, until this more reliable information is forthcoming, it is necessary to

NOTES ON MANURING

make use of two sources of guidance, viz., of the practice of successful growers and of general principles (e.g., knowledge of the requirements of similar species of farm crops and of the properties of the various fertilizers).

The leading growers of both farm and market garden crops have always been justly famed for the acuteness of their powers of observation, and this alone is an excellent reason for paying the utmost attention and respect to their recommendations. Further, crop-growing is such an ancient art that an enormous accumulation of experience exists, and it is quite possible that the more modern weapons of scientific method, when applied to test gardening practices will, in the first place, merely provide explanations of what the gardener has long believed, and in the second place only suggest minor modifications or alternatives that will produce equally excellent results.

An excellent example of well-established though empirical knowledge is provided by the reaction of horticultural crops to fresh dung. One group of plants—carrots, beetroots, parsnips, and outdoor lettuces—are adversely affected by fresh dung, and they are best grown on land in good heart that has been well dressed with bulky organic manures in the previous season. With the root crops mentioned fresh manure is apt to produce coarse fangy roots, and with lettuces there is a tendency to fungoid diseases, and to the condition known as “greasy nose.”

Most other market garden crops fall into a second group that will thrive on fresh manure—indeed, this is almost essential if first-class results are to be obtained. It is for this reason that the supply of organic manures is such an important question for the market gardener, and any fresh discoveries that demonstrate how he may be more independent of existing supplies will be warmly welcomed. Possibly the most helpful advice at the moment is (1) to use less dung under glass (for such crops as tomatoes), where water will certainly be available, in order to have more dung for outdoor use, where it is so important for maintaining the humus contents of the soil to resist drought; (2) wherever possible to grow a cheap crop like mustard for green manuring; and (3) to conserve all waste organic matter by methods like those advocated by A. Howard in India,* and Hutchison and Richards in this country.†

* See *Nature*, Nov. 25, 1933, p. 828.

† See this JOURNAL, Vol. XXVIII, Aug., 1921.

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Turning to the manurial dressings, other than dung, that have been commonly used in the past, it is probable that one of their weaknesses has been an under-estimation of the importance of potash with, perhaps, an over-estimation of the need for phosphate. This has now been fairly conclusively established for the potato, but is possibly true for a number of other crops.

In the absence of detailed information for each crop under varying soil and climatic conditions it is legitimate to recommend a general dressing that will probably be reasonably well balanced for many purposes.

Thus, in Hertfordshire, the mixture recommended for farm use could be adopted, unless phosphates have been largely used in the past, in which case probably 3 parts of sulphate of ammonia, 3 of superphosphate, 3 of sulphate of potash and 1 part of bone flour would be more suitable. In other parts of the country where phosphate has been proved of greater and potash of lesser importance, the proportions could be altered to sulphate of ammonia 3, superphosphate 4, sulphate of potash 2, and bone flour 1. These mixtures could be used at rates varying from 6 up to 10, 12 or even more cwt. per acre, according to the crop, amount of dung used, condition of the soil, etc. Lettuce-growers would probably prefer to replace the sulphate of ammonia by an organic material such as meat meal or freshly-ground hoof and horn.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended January 17				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 7 16d	£ 7 16d	£ 7 16d	£ 7 16d	s. 10 1
„ „ Granulated (N. 16%) ..	7 16d	7 16d	7 16d	7 16d	9 9
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	7 2d	7 2d	7 2d	7 2d	6 11
Calcium cyanamide (N. 20.6%)	7 3e	7 3e	7 3e	7 3e	6 11
Kainit (Pot. 14%) ..	3 6	3 0	2 17	3 0g	4 3
Potash salts (Pot. 30%) ..	5 4	5 1	4 17	5 0g	3 4
„ „ (Pot. 20%) ..	3 15	3 9	3 6	3 10g	3 6
Muriate of potash (Pot. 50%)	9 8	9 1	8 15	9 2g	3 8
Sulphate „ „ (Pot. 48%)	10 12	10 7	10 0	10 7g	4 4
Basic slag (P.A. 15½%)||	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%)||	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%)	3 2	..	3 4	2 16k	3 6
„ „ (S.P.A. 13½%)	2 17	2 11	3 0	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	7 15	6 15f	6 15f	6 7	..
Steamed bone-flour (N. 4%, P.A. 27½-29½%) ..	..	5 12	5 10f	5 7	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price.

|| Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc. (Agric.),
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Home-Grown Oats for Ewes.—There has recently been published the report of Sheep Crossing Experiments conducted by Leeds University, Department of Agriculture, at Askham Bryan, Yorks. In one set of trials Cheviot ewes were employed, and four lots of 20 were crossed respectively with Ryeland, Shropshire, South Down and Suffolk rams. In the other series, lots of 15 Masham (Wensleydale-Swaledale cross) ewes were crossed with Leicester, Oxford and Suffolk rams.

All the ewes were treated alike, and the methods of management are of general interest, in that they are widely applicable under ordinary commercial conditions. Before tupping the ewes were drenched with a 1 per cent. solution of copper sulphate, and treated also with carbon tetrachloride capsules. The rams were with the ewes from September 29 to November 23, 1932, and during the mating season, the ewes were on grass paddocks—5 acres to 20 ewes. After the rams were removed all the ewes ran together on grass. From January 1, 1933, good quality seeds hay was fed in racks, and on January 20 this was supplemented with an allowance of rolled oats at the rate of $\frac{1}{4}$ lb. per head per day. The concentrated food was increased first to $\frac{3}{8}$ lb. and then to $\frac{1}{2}$ lb. per head by February 24. During a snowstorm hay was amply supplied. After lambing, the ewes were given a limited quantity of mangolds, and the oats were increased to $\frac{5}{8}$ lb. per day. Later the concentrated food was reduced to $\frac{1}{2}$ lb. per head daily of a mixture consisting of 3 parts by weight of rolled oats and 1 of whole maize. Finally, the concentrated food was discontinued altogether on May 28.

From April 27 onwards the lambs were fed in a "creep," independent of their mothers, on the following mixture (parts by weight):—1 linseed cake, 1 earthenut cake, 1 locust beans, 3 flaked maize.

Each lot of 20 Cheviots reared from 29 to 32 lambs, or on the average fully 150 per cent., which must be regarded as a very satisfactory number for this breed. The lambs

NOTES ON FEEDING

were sold fat after they were 70 lb. live weight, which they reached at about 19 weeks old. The three lots of fifteen Masham ewes averaged 21.3 lambs reared, or just under 150 per cent. The Mashams' lambs were sold at about 80 lb. live weight at 18 to 21 weeks old.

We are not concerned here with the comparative results obtained from the various rams; it is sufficient to note that the butcher commented most favourably upon the South Down crosses. Apparently all the lambs sold on any particular day were paid for at a flat rate per lb., the price gradually falling from 1s. to 9d. per lb. as the season advanced. It would, however, convey more information as to the comparative economic value of the sires used, if the lambs had been sold at differential prices on a quality basis. One would like to know how much more the butcher would have been prepared to pay per lb. for the South Down crosses in consideration of their superior quality. This would seem to be an important point in determining the ram economically most suitable.

From the point of view of feeding, the main interest of the experiment lies in the methods employed. The concentrated food of the ewes up to lambing consisted of rolled oats. Later, presumably for some reason connected with available supplies, maize was introduced to the extent of one-quarter of the ration. There is no reason to assume that the maize was actually necessary, and it seems safe to conclude that the ewes could have been fed equally satisfactorily as regards concentrates, entirely upon rolled oats from January 1 until concentrated feeding ceased towards the end of May.

Attention has been directed from time to time in these notes to the fact that British-grown oats have been consistently cheap, and it should be of particular interest to sheep breeders who have stocks of home-grown oats on hand, that these ewes in Yorkshire produced a satisfactory number of lambs and reared them well on grass, a few mangolds, hay and oats without the aid of purchased protein-rich cakes. It is true that for the lambs an attractive mixture containing both linseed cake and earthenut cake was provided, and it is of interest to note that this mixture contained 0.16 lb. protein equivalent in relation to 0.78 lb. starch equivalent. Kibbled locust beans and flaked maize are well tried and recognized good foods for inclusion in a lamb mixture, while the two cakes are palatable and of

NOTES ON FEEDING

known repute. The only point about which special care need be taken is that earthen cake should be crushed fine enough to allow of its being well and completely mixed with the other foods, so that the stronger lambs cannot pick it out of the mixture.

Wheat Germ.—In a recent note attention was drawn to the success with which wheat germ meal and wheat germ oil have been employed in nutrition experiments. The difficulty with commercial wheat germ under ordinary farm conditions is that it is apt to deteriorate when stored. A series of storage experiments were made in U.S.A. (Minneapolis) to determine conditions that would improve the keeping quality and retard the development of objectionable taste and odour in commercial wheat germ. It was noticed that increase in acidity was coincident with the development of unpleasant taste and smell, and that the rate of increase in acidity depended primarily upon temperature during storage. Commercial wheat germ was kept in fresh condition for many months at refrigeration temperatures.

It seems probable that wheat germ is most likely to be required in rations for farm stock in winter. In summer, animals at grass should be in a position to obtain adequate supplies of vitamin E from ordinary sources. It is possible, of course, that wheat germ may contain properties of special value, apart altogether from its vitamin content. At present these properties may not be completely understood; but a process of treatment that would preserve the complete nutritive value of wheat germ and prevent its deterioration in taste and quality when stored is likely to be welcomed. As far as the winter months are concerned, the writer is finding that commercial wheat germ remains fresh and sweet sufficiently long to allow of its being included in rations for farm stock without trouble arising from its becoming rancid and unpleasant to stock. Our experience in this respect, however, applies to the colder months only.

Outdoor v. Indoor Pig Rearing.—It is claimed that a series of experiments carried out at Wye College showed that outdoor pigs made more rapid and economical growth than those kept indoors. The experiments conducted in summer and the indoor pigs received no green food. This is an important point, and should neither be lost sight

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of nor minimised, since it is widely recognized that green food or a suitable substitute is desirable for pigs kept indoors and fed on an ordinary ration consisting of cereals, weatings and a protein-rich food. The pigs used for the experiments at Wye are described as strong stores weighing, at the outset of the different trials, from 47 to 60 lb. The experiments were continued for a period of two months in each instance. The indoor pigs were allowed as much food as they would clear up, and the outdoor ones were given the same quantity as those indoors. It was found that the outdoor pigs grew more quickly and consumed less food—in the most recent trial, 323 lb. compared with 347 lb. for the indoor pigs, per 100 lb. live-weight increase. It is stated that the food value of the grass consumed was very small, but one would be inclined to think that the grass was at least partly responsible for the saving in food used out of doors.

One is left in some doubt whether outdoor summer conditions invariably or even generally, are more favourable than indoor. Very much depends upon the efficiency of the housing. To secure first-rate results indoors, conditions of housing must be essentially suitable for the pigs. If indoor pigs suffer from great heat amounting to discomfort, or are kept in a close and stuffy atmosphere—without adequate fresh air and ventilation—it is reasonable to expect that pigs out of doors will have keener appetites and thrive better. The fact that 8 of the pigs indoors, in one Wye experiment, suffered from digestive troubles, whereas none of those out of doors were similarly affected, raises the question whether the indoor conditions were really suitable and satisfactory, particularly in relation to the weather conditions at the time of year, and whether the digestive disorders that delayed growth and interfered with the economy of food consumption indoors arose in part from the absence of fresh green food. It would not seem safe to conclude that the question is settled as between indoor and outdoor systems of feeding under average conditions.

It is stated that the experiments show also that it is not economical to limit the ration of grazing pigs. This is an interesting contribution to the knowledge on the subject, but apart from economy as regards live-weight increase in relation to food consumed, there is the further important question of carcass quality. Study of carcasses seems to indicate that rate of growth, which is steady but slower

FARM VALUES OF FEEDING STUFFS

than the maximum, may result in less fat in the carcass and a higher percentage of lean. In view of the present grading system, and of the fact that payment for bacon pigs is made upon a quality basis, it is very important that in all questions of economic production the effect of feeding on carcass quality should be kept well in the forefront.

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	4 11
Maize	78	7.6	5 1
Decorticated ground nut cake ..	73	41.3	7 0
„ cotton cake ..	68	34.7	6 12

(Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.29 shillings, and per unit protein equivalent, 1.45 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The “food values,” which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1933, issue of the Ministry's JOURNAL, p. 784.)

FARM VALUES.

Crop	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9.6	5 7
Oats	60	7.6	4 8
Barley	71	6.2	5 1
Potatoes	18	0.8	1 4
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 10
Beans	66	19.7	5 14
Good meadow hay	37	4.6	2 14
Good oat straw	20	0.9	1 7
Good clover hay	38	7.0	2 19
Vetch and oat silage	13	1.6	0 19
Barley straw	23	0.7	1 11
Wheat straw	13	0.1	0 17
Bean straw	23	1.7	1 12

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

Description	Price per ton	Manu-rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro-tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	5 0	0 8	4 12	72	1 3	0.67	9.6
Barley, British feeding	5 15	0 8	5 7	71	1 6	0.80	6.2
" Argentine	4 15 ^s	0 8	4 7	71	1 3	0.67	6.2
" Danubian	4 12	0 8	4 4	71	1 2	0.62	6.2
" Persian	4 7*	0 8	3 19	71	1 1	0.58	6.2
" Russian	4 12	0 8	4 4	71	1 2	0.62	6.2
Oats, English white	6 0	0 9	5 11	60	1 10	0.98	7.6
" black and grey	5 13	0 9	5 4	60	1 9	0.94	7.6
" Scotch white	6 10	0 9	6 1	60	2 0	1.07	7.6
" Canadian No. 2 Western	6 2	0 9	5 13	60	1 11	1.03	7.6
" mixed feed	4 13	0 9	4 4	60	1 5	0.76	7.6
" Argentine	5 10	0 9	5 1	60	1 8	0.89	7.6
" Chilian	5 10	0 9	5 1	60	1 8	0.89	7.6
" Russian	5 5	0 9	4 16	60	1 7	0.85	7.6
Maize, American	5 7†	0 7	5 0	78	1 3	1.67	7.6
" Argentine	4 15	0 7	4 8	78	1 2	0.62	7.6
Beans, English Winter	5 15 ^s	0 16	4 19	66	1 6	0.80	19.7
Peas, English, blue	12 5 ^s	0 14	11 11	69	3 4	1.78	18.1
" Japanese	19 0†	0 14	18 6	69	5 4	2.86	18.1
Dari	6 15†	0 7	6 8	74	1 9	0.94	7.2
Milling offals—Bran, British	5 5	0 15	4 10	43	2 1	1.12	9.9
" broad	5 17	0 15	5 2	43	2 4	1.25	10
" Middlings, fine imported	5 7	0 12	4 15	69	1 5	0.76	12.1
" Pollards, imported	4 17	0 13	4 4	62	1 4	0.71	11
Meal, barley	6 5	0 8	5 17	71	1 8	0.89	6.2
" " grade II	5 10	0 8	5 2	71	1 5	0.76	6.2
" maize	5 12	0 7	5 5	78	1 4	0.71	7.6
" " South African	5 15*	0 7	5 8	78	1 5	0.76	7.6
" " germ	5 10	0 11	4 19	79	1 3	0.67	8.5
" locust bean	7 0	0 5	6 15	71	1 11	1.03	3.6
" bean	8 0	0 16	7 4	66	2 2	1.16	19.7
" fish	15 0	1 19	13 1	59	4 5	2.37	53
Maize, cooked flaked	6 2	0 7	5 15	84	1 4	0.71	9.2
" gluten feed	5 17	0 12	5 5	76	1 5	0.76	19.2
Linseed cake, English, 12% oil	9 5	0 19	8 6	74	2 3	1.20	24.6
" " " 9% "	8 17	0 19	7 18	74	2 2	1.16	24.6
" " " 8% "	8 12	0 19	7 13	74	2 1	1.12	24.6
" " " 6% "	8 17 ^s	0 19	7 18	74	2 2	1.16	24.6
Soya-bean cake, 5½% oil	7 17*	1 7	6 10	69	1 11	1.03	36.9
Cottonseed cake—English, Egyp- tian seed, 4½% oil	4 7	0 18	3 9	42	1 8	0.89	17.3
" " English, Indian seed, 4% oil	4 7 ^s	0 18	3 9	42	1 8	0.89	17.3
" " Egyptian, 4½% oil	3 17	0 18	2 19	42	1 5	0.76	17.3
" " decorticated, 7% "	6 12†	1 7	5 5	68	1 7	0.85	34.7
" meal, decorticated, 7% "	6 10†	1 7	5 3	68	1 6	0.80	34.7
Coconut cake, 6% oil	5 17†	0 17	5 0	77	1 4	0.71	16.4
Ground-nut cake, 6-7% oil	5 17*	0 18	4 19	57	1 9	0.94	27.3
" " " decor., 6-7% oil	7 0	1 7	5 13	73	1 7	0.85	41.3
" " " imported, decorticated, 6-7% oil	7 0	1 7	5 13	73	1 7	0.85	41.3
Palm-kernel cake, 4½-5½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 4½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 1-2% oil	5 5	0 12	4 13	71	1 4	0.71	16.5
Feeding treacle	5 0	0 8	4 12	51	1 10	0.98	2.7
Brewers' grains, dried ale	5 0	0 10	4 10	48	1 11	1.03	12.5
" " " porter	4 17	0 10	4 7	48	1 10	0.98	12.5
Dried Sugar Beet Pulp (a)	5 0	0 5	4 15	66	1 5	0.76	5.2

(a) Carriage paid in 5 ton lots. *At Bristol. ‡At Hull. †At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the beginning of Jan., 1934, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5^d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.29d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the

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Wart Disease Immunity Trials, 1934

THE Ministry will continue during the coming season to test, at the Potato Testing Station of the National Institute of Agricultural Botany at Ormskirk, Potatoes and Potato Seedlings as to their immunity from or susceptibility to Wart Disease on the conditions stated below.

The entry form (No. 345 H.D.). obtainable from the Ministry should be filled up and returned to the Potato Testing Station, Ormskirk, Lancs., *with the requisite fees.* Samples must be sent to that Station *as early as possible, but in any case not later than March 1.*

Potatoes are accepted from *English, Scottish and Irish growers* for trial under the following conditions:—

(a) Quantity of each stock of Potato to be sent for the first time—50 seed size tubers.

Quantity of each stock of Potato to be sent for the second and for subsequent years—35 seed size tubers.

(b) Fees on the following scale are payable in respect of each stock of Potato when first entered for immunity trials:—

Less than 5 samples from one grower 10s. per sample.

5 samples or more from one grower 8s. per sample up to 20, and 6s. for each sample in excess of 20.

These fees are not returnable under any circumstances.

(c) The Ministry, while taking reasonable precautions to secure satisfactory growth, can accept no responsibility for the failure of any variety.

(d) The Ministry will take all reasonable precautions to secure that all the produce of the trial plots is fed to stock after being thoroughly mixed together, except such portions as may be needed for exhibition or scientific purposes authorized by the Ministry. The Ministry, however, reserves the right to send tubers from the produce grown at Ormskirk for testing at the official stations of the Department of Agriculture for Scotland and the Ministry of Agriculture for Northern Ireland.

(e) All stocks entered for the trials will be tested both in the laboratory and in the field. When the Ministry is satisfied as a result of the trials that a variety is immune from Wart Disease, it will formally "approve" the variety and will issue an official certificate of immunity. Such certificates will not be issued until the variety has been named and until an assurance has been received from the sender that it has been, or is about to be, introduced into commerce. *When a variety tested under a number or letter has been subsequently named and "approved," a sample of 100 tubers of the variety as named must be sent to Ormskirk for comparison with the tested stock.* No certificate will be issued for any new variety until it has passed at least two consecutive years' tests without contracting the disease and has been declared by the Synonym Committee of the National Institute of Agricultural Botany to be distinct from existing varieties.

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Potatoes are accepted *from foreign growers* on the conditions (a) to (d) set out above, but no foreign variety will be formally "approved" and no certificate will be issued until the variety is definitely introduced into commerce in Great Britain.

Trials of Seedlings.—The Ministry desires to encourage the breeding of new varieties of potatoes, and in order to provide information for breeders of seedlings it is prepared to accept not fewer than two tubers, and not more than ten tubers, of any seedlings for testing in the laboratory and growing for one season on the trial plots, and to furnish a report on the results obtained, without payment of a fee. These tests, however, will not be considered as forming part of the Immunity Trials proper, and will not be reckoned in the minimum period of two years referred to under (e). The results of these tests will not be included in any report issued by the Ministry.

GENERAL INSTRUCTIONS: *Carriage.*—Small consignments should be sent by passenger train, carriage paid, or by parcel post; larger consignments should be forwarded by goods train, carriage paid.

Labels.—All consignments should be distinctly labelled. A label bearing the name and address of the sender and name of variety or seedling number should be firmly tied to the bag; in addition a similar label should be placed inside the bag.

Address.—All consignments should be addressed to:—

THE SUPERINTENDENT,
POTATO TESTING STATION,
NATIONAL INSTITUTE OF AGRICULTURAL BOTANY,
ORMSKIRK, LANCs.

Station: Ormskirk, L.M. & S. Railway.

Date of Forwarding.—Consignments should be sent so as to reach the Testing Station as early as possible, and in any case not later than March 1.

The Agricultural Index Number

THE general index number of the prices of agricultural produce for December at 10 per cent. above pre-war was one point higher on the month and 7 points above the figure recorded a year ago. The rise of one point in the general figure was due principally to the higher index for milk: the indices for fat pigs and hay also showed an advance, but there were decreases in fat cattle and sheep, eggs, poultry and potatoes.

Grain.—Wheat at 4s. 6d. per cwt. was 1d. cheaper than in the previous month, but the index at 6r was unchanged. Barley showed a fall of 2d. per cwt. to an average of 9s. 2d., but the index rose one point to 111 as the price reduction

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Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1928.	1929.	1930.	1931.	1932.	1933.
January	145	145	148	130	122	107
February	143	144	144	126	117	106
March	145	143	139	123	113	102
April	151	146	137	123	117	105
May	154	144	134	122	115	102
June	153	140	131	123	111	100
July	145	141	134	121	106	101
August	144	152	135	121	105	105
September	144	152	142	120	104	107
October	139	142	129	113	100	107
November	141	144	129	112	101	109
December	140	143	126	117	103	110

was proportionately larger in the base period. Oats at 5s. 3d. per cwt. were cheaper by 1d. and the index was one point lower at 75. A year ago the index numbers for wheat, barley and oats were 72, 84 and 81 respectively.

Live Stock.—As is usual during December the prices of fat cattle and sheep showed a rise, the former being dearer by 1s. 4d. per live cwt. and the latter by $\frac{1}{4}$ d. per lb. As, however, these increases were not proportionately so large as those which occurred in December, 1911-13, the relative indices at 97 and 106 were 3 and 4 points lower respectively. Bacon pigs were 6d. per score dearer during the month under review and the index moved upwards by 5 points; the corresponding advances in pork pigs were 11d. per score and 8 points. Dairy cows and store cattle showed little material change either as regards price or index. Store sheep were a little dearer but the index declined 4 points to 86, as there was a greater increase in prices between November and December of the base period. Quotations for store pigs also advanced and the index at 147 was 3 points higher than in the previous month.

Dairy and Poultry Produce.—An increase of 1d. per gal. occurred in the contract price for sales of milk in the South-Eastern region of England in December, and the index for December was 167 as compared with 161 in November and 155 a year earlier. Butter was about $\frac{3}{4}$ d. per lb. dearer and was 3 per cent. below pre-war as against 5 per cent. below in November. Quotations for cheese rose a little during the month under review and the index at 106 was one point higher. Values for eggs depreciated to the extent of 3d. per dozen and the index fell by 9 points to 99. A year ago the index was 7 points lower at 92.

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Other Commodities.—Potatoes were about 2s. per ton cheaper on the month and the index declined 3 points to 112 or 8 points below the level of December, 1932. Both clover and meadow hay were a little dearer and the combined index at 80 was 2 points higher on the month. The recent upward movement in wool prices has been continued and the index rose 3 points to 84, which compares with a figure of 62 in December, 1932. Vegetables were dearer than in November and the index advanced by 27 points to 165.

Monthly index number of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity.	1931.	1932.	1933.			
	Dec.	Dec.	Sept.	Oct.	Nov.	Dec.
Wheat	86	72	63	65	61	61
Barley	102	84	129	120	110	111
Oats	99	81	78	78	76	75
Fat cattle	110	101	99	99	100	97
„ sheep	106	91	100	107	110	106
Bacon pigs	87	92	101	97	104	109
Pork	103	103	106	110	118	126
Dairy cows	125	114	110	114	107	106
Store cattle	117	103	94	89	85	85
„ sheep	101	72	83	86	90	86
„ pigs	120	108	132	139	144	147
Eggs	93	92	115	112	108	99
Poultry	139	115	121	122	120	110
Milk	150	155	160	157	161	167
Butter	110	98	98	98	95	97
Cheese	111	114	110	103	105	106
Potatoes	259	120	99	110	115	112
Hay	77	67	73	74	78	80
Wool	79	62	76	79	81	84

Potato Acreages in Scotland, 1933

THE following table, which has been prepared from a statement issued by the Department of Agriculture for Scotland, shows the acreages of potatoes grown in Scotland in 1933, with corresponding acreages in 1932.

	1933.	1932.
	<i>Acres.</i>	<i>Acres.</i>
Total acreage grown	153,000	148,000
Total first earlies	17,900	14,673
Total second earlies	15,192	15,104
Total main crops	101,545	101,885
Area unclassified	18,363	16,338

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Acreage figures for the most important varieties only are as follows:—

	1933. Acres.	1932. Acres.
<i>First Earlies:—</i>		
Epicure	9,759	8,683
Sharpe's Express	2,684	1,931
Eclipse, etc.	2,383	1,531
Duke of York, etc.	1,827	1,484
Ninetyfold	308	268
May Queen	215	192
<i>Second Earlies:—</i>		
Great Scot	8,810	9,048
British Queen, etc.	3,894	3,800
Royal Kidney, etc.	675	491
Ally	421	390
Edzell Blue	325	281
Ben Lomond	258	202
Arran Comrade	231	294
<i>Main Crops:—</i>		
<i>Immune:</i>		
Kerr's Pink	56,739	62,103
Majestic	11,116	8,494
Golden Wonder	8,822	9,369
Dunbar Cavalier	1,971	710
Arran Banner	1,795	1,174
Arran Consul	1,144	875
<i>Non-immune:</i>		
King Edward VII	14,188	12,261
Arran Chief	1,729	2,212
Up-to-Date	879	1,087
Field Marshal	459	466

The total acreage of potatoes planted in Scotland in 1933 was larger than in 1932 by 5,000 acres, or nearly 3½ per cent., and was approximately 25,000 acres above the total for 1931. The acreages under first and second early varieties were both larger on the year, especially the former, which was greater by 3,227 acres or about 22 per cent., all the principal first early varieties sharing in the increase. The acreage under second earlies was only 88 acres larger; increases in the principal varieties were almost offset by the decrease of 238 acres in Great Scot. The total area of main crop potatoes was smaller than in 1932 by 340 acres, the most notable features being the decrease of 5,364 acres in Kerr's Pink and increases of 2,622 and 1,927 acres respectively in the acreages of Majestic and King Edward VII. Advances were also shown in most of the immune varieties, Dunbar Cavalier by 1,261 acres, Arran Banner by 621 acres and Arran Consul by 269 acres. Except for King Edward VII, however, non-immune varieties were grown on smaller acreages than in 1932.

An estimate of the yield of potatoes in Scotland for 1933

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is not yet available but for comparative purposes it may be noted that the preliminary estimate of the average yield per acre in England and Wales this year was 6.4 tons per acre, or 0.2 tons below that of 1932.

Enforcement of Minimum Rates of Wages.—During the month ending January 14, legal proceedings were taken against three employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
		£ s. d.	£ s. d.	£ s. d.	
Devon ...	Bideford ...	8 0 0	8 6	40 0 0	2
Yorks, N.R....	Guisborough .	1 0 0	5 0	6 11 4	1
Carmarthen...	Carmarthen...	1 0 0	—	4 10 0	1
		£10 0 0	£0 13 6	£51 1 4	4

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on Monday, January 22, 1934, Mr. W. B. Yates, C.B.E., J.P., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders.

Cambridgeshire and Isle of Ely.—An Order fixing minimum and overtime rates of wages for male and female workers to come into force on February 1, 1934 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until October 31, 1934. The minimum rates of wages are:—

(1) For male workers of 21 years of age and over employed wholly or mainly as horsemen, cowmen or shepherds (other than workers employed solely as stockmen or yardmen) 37s. (as at present) per week of the hours necessary for the performance of their customary duties.

(2) For other male workers of 21 years of age and over, 30s. 6d. (instead of 30s. as at present) per week of 48 hours in any week in winter, 42 hours in the weeks in which Good Friday, Whit-Monday and August Bank Holiday fall and 50 hours (instead of 51 as at present) in any other week. Provision is made for an adjustment of the hours in respect of which the minimum weekly wage is fixed in the week in which August Bank Holiday falls to meet cases where an alternative holiday is given on July 30, 1934. The overtime rates are 8d. per hour on weekdays and 10d. per hour on Sundays, Good Friday, Whit-Monday and August Bank Holiday.

(3) For female workers of 18 years of age and over 5½d. per hour with overtime at 7d. per hour as at present.

Oxfordshire.—An Order fixing minimum and overtime rates of wages for male and female workers to come into force on February 4, 1934 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until May 5, 1934. The minimum rates for male workers of 21

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years of age and over are 29s. (instead of 28s. as at present) per week of 48 hours in any week in winter, 41 hours in the weeks in which Good Friday and Easter Monday fall and 50 hours in any other week in summer, with overtime throughout the period at 8½*d.* per hour on weekdays and 10½*d.* per hour on Sundays, Good Friday and Easter Monday (instead of 8*d.* and 10*d.* per hour respectively). For female workers of 18 years of age and over the minimum rate is unchanged at 6*d.* per hour with overtime as at present at 7½*d.* per hour on weekdays and 9*d.* per hour on Sundays, Good Friday and Easter Monday.

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Cheshire: Mr. N. F. McCann, B.Sc. (Agric.), N.D.A., has been appointed Assistant Lecturer in Agriculture and Lecturer in Book-keeping, *vice* Mr. S. Barratt, B.Sc. (Agric.), N.D.A.

Miss M. Jones, N.D.D., has been appointed Assistant Instructor in Dairying, *vice* Miss U. A. P. Groves, N.D.D.

Staffs at University Departments of Agriculture, Agricultural Colleges, etc., in England and Wales

University of Durham: Armstrong College, Newcastle-upon-Tyne: Mr. John Telfer, Assistant Bursar, has been appointed Bursar of the College, *vice* Mr. R. N. Wilkinson, retired.

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Plants Useful to Man. By W. W. Robbins and F. Ramaley. Pp. xxiv + 428, and 241 figs. (Philadelphia: P. Blakiston's Son & Co., Inc., 1012 Walnut St. 1933. Price \$3.)

In the preface the authors of this work state that it is intended to supplement the usual text-books of botany, which are necessarily concerned chiefly with fundamental conceptions of morphology and physiology, and to supply information that will be of value to "college students, high-school teachers, and the interested public." The subject matter is stated to be derived largely from Robbins' "Botany of Crop Plants," and the plants dealt with are chiefly the crop plants of the United States, the ornamental plants commonly met with in that country, and some of the better-known tropical economic plants. The plants are grouped together in chapters mainly according to families, though chapters on general subjects, such as "medicinal plants," "tea, coffee and chocolate," "spices and tropical fruits," etc., are also included. Under the more important species instructive notes are given regarding the origin and history of the plant, its distribution, cultural requirements, uses, varieties, etc. Some important crops of this country, such as the potato, sugar beet, wheat, and other cereals, receive special attention. It is felt, however, that the work hardly complies with, or does justice to, the ambitious title it bears: "Plants Useful to Man." A subject of this magnitude could only be dealt with adequately in a considerably larger work. Many important food plants and other plants useful to man in warm countries and of commercial importance are not even mentioned in the book; one need but instance the oil palm of West Africa, cassava, sesamum, arrowroot, jute, sunn hemp, castor oil, and numerous commercial drug plants. Certain statements occurring in the book are open to question. The grapefruit is listed among Old World species known to have been cultivated for two

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thousand years or more, which is contrary to the established belief that the grapefruit originated as a sport or chance seedling in the West Indies early in the eighteenth century.

An arrangement of the plants dealt with either botanically or according to subject instead of a combination of both systems would probably have been preferred by many. In some instances families that are not closely allied are treated together. Thus there is a chapter entitled "Mulberry and Buckwheat Families," and one "Palm and Banana Families." Under the existing arrangement overlapping occurs and is more or less inevitable. With one chapter devoted to "table fruits and nuts" and another to "spices and tropical fruits," one is prompted to ask what is the essential difference between a "table" and a "tropical" fruit?

The volume is well printed, freely illustrated with photographs and line drawings, and comparatively free from printers' errors.

The Progress of a Plough-Boy to a Seat in Parliament as exemplified in the history of the life of William Cobbett, Member for Oldham. Edited by William Reitzel. Pp. vii + 332. (London: Faber and Faber Ltd. 1933. Price 7s. 6d.)

The life of William Cobbett is one for which we have a number of biographies, the latest and most ample of which is perhaps that recently issued under the authorship of G. D. H. Cole. The present work is somewhat of a curiosity of literature. It is true that Cobbett himself had designed an autobiography under this title and had not completed it; but there is a certain wonder at the industry of Mr. Reitzel in making the present compilation. To take the whole of the work of such a voluminous writer as Cobbett, to extract from this mass of material the particular passages which were autobiographical in character, and to arrange them in chronological order, must have been a stupendous task. Mr. Reitzel is to be congratulated upon the success with which he has carried it out.

The life of Cobbett was extremely adventurous and romantic, and he was himself a character of such virility, that to a modern reader he often seems to have been lacking in judgment. His influence on contemporary affairs was, however, extremely marked, and his ever-present interest in agriculture, and particularly in those who were actually doing the work of the farms, is sufficient to excite the interest of the readers of this journal in this cleverly compiled and surprisingly brief account of his life. Readers of "Rural Rides" and Cobbett's lesser-known works will be at first surprised and then charmed by their recognition of individual passages with which they are already acquainted, and by the continuous similarity of style with which the great William expressed himself throughout his career. It is not the place here to give any details of his life; his admirers will already know the main outlines, and must be referred to Mr. Reitzel's work to fill them in. For a modern commentary on this autobiography they cannot do better than turn to Cole's work, which has already been referred to above.

Financing the Farmer. By C. S. Orwin. Pp. 27. (Oxford: The Clarendon Press; London: Humphrey Milford. 1933. Price 1s.)

Mr. Orwin's pamphlet is written with the clearness and distinction we are accustomed to expect from him. He first of all passes in review the previous attempts to improve the machinery of agricultural credit, and refers in particular to the Acts of 1923 and 1928. In pointing out the relative failure of the latter to increase the volume of short-term credit, he is perhaps inclined to overlook the fundamental difficulty in the way of its wider use, namely, the heavy and continuous contraction in the value of farm assets during practically the whole period in which the Act has been in operation. Nor is he quite correct in saying (with reference to the short-term credit provisions of the Act)

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that "One of the Big Five stood aside and refused to operate it from the start." Agricultural charges under the Act have in fact been registered by all the Big Five Banks, and none of them has refused to operate this part of the Act.

Mr. Orwin's main purpose, however, is to call attention to the system used by Midland Marts, Ltd., at Banbury, in making advances to farmers who purchase live stock through its agency, and to suggest that this method should be more extensively used. The essence of the system, as far as the provision of credit is concerned, is that the Midland Marts Ltd., act as an intermediary between the bank and the farmer. The farmer purchasing live stock through the market pays a deposit of 15 per cent. on the purchase price and may borrow the remaining 85 per cent. at an agreed rate of interest, subject to an undertaking to pay this balance at a future date. On the strength of these undertakings the market obtains advances from the bank to enable it to finance these credit transactions.

Mr. Orwin's suggestion is that a similar system might be adopted universally by merchants, co-operative societies, etc., and that the National Farmers' Union might take the initiative by drawing up a simple form of contract that could be referred to on invoices, so that farmers could specify to their suppliers that they wished to be quoted "on the National Farmers' Union invoice." If this were done, he thinks that it "would quickly become the common method of dealing throughout the country."

The British Isles: A Geographic and Economic Survey. By L. D. Stamp, B.A., D.Sc., F.R.G.S., and Stanley H. Beaver, M.A. With contributions by Sir Josiah Stamp, G.B.E. D.Sc., LL.D., F.B.A., and D. K. Smee, M.A., Ph.D. Pp. xii + 719. Numerous maps and illustrations. (London: Longmans, Green and Co. 1933. Price 25s.)

Dr. Dudley Stamp and Mr. Beaver have undertaken a difficult task, and have performed an exceedingly valuable service. This work seeks to take stock of the National resources of the British Isles and to present the results in a form that will be useful not only to the man in the street, but to the business man and the student. It is a fascinating book. Not merely does it contain a mine of information but the material is presented in a very readable form. Moreover, the authors have done more than give a bare statement of the facts. They have sought to give the facts an analytical treatment, with some account of why the means of production have assumed the form they have, and why they are distributed throughout the country in the way they are. These are important questions in any study of the economic resources of this country. They are certainly important in the study of its agricultural resources, to which a substantial section of the present volume is devoted. How few writers, in advocating an expansion of home agriculture take into account, for example, the relationship between the wheat map and the weather map of the United Kingdom, or between the geological formation of the country and the distribution of other agricultural enterprises! These, however, are fundamental and unalterable conditions.

To the agricultural student the most valuable sections of the book are the ten chapters (out of a total of thirty-three) that deal with agricultural matters. These include a brief account of British agriculture (Chapter 10) together with three chapters on the agricultural regions of England and Wales, Scotland and Ireland respectively. In addition there are important chapters on the physiography, weather, climate and soil of the British Isles, and two further chapters on land utilization, and the natural vegetation of the country.

The book can be recommended both as a book of reference and as a critical survey.

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THE JOURNAL OF THE MINISTRY OF AGRICULTURE

Vol. XL No. 12 March, 1934

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Milk Policy

THE following statement was made by the Minister in the House of Commons on Thursday, February 22, 1934:—

I rise by leave of the House to make an announcement with regard to milk policy. As the statement contains a number of figures and technical details, I have arranged for copies to be available in the Vote Office for Members as soon as I sit down.

The Government has been giving close consideration to the supply position of milk and milk products in this country. As the House will be aware, there is a volume of milk surplus to present liquid requirements which is estimated to be little short of 20 per cent. of the total volume of milk sold under contract this winter, and is likely to be about 40 per cent. of the larger volume of contract supplies available in the spring and summer. This surplus milk has to find a market in manufactured form, chiefly as butter and cheese. Prices of butter and cheese are at very low levels, owing to exceptionally heavy imports and present market conditions generally. There is thus a grave danger that the price structure of the whole milk producing industry in this country will be seriously undermined, particularly when the spring and summer flush of milk comes on to the market.

An expansion of the liquid milk consumption of the country would not only be of the greatest benefit from the public health point of view but would alleviate in the most satisfactory way the difficulty of "surplus milk." If this increase in consumption is to be obtained, it must be based on public confidence as to the purity of the supply.

The Government accordingly proposes—

(1) That for the two years beginning April 1, 1934, the Milk Marketing Board shall be guaranteed by the Govern-

NOTES FOR THE MONTH

ment by means of Exchequer advances, minimum prices of 5*d.* per gallon in summer (April—September) and 6*d.* per gallon in winter, in respect of milk manufactured in factories in Great Britain. For milk manufactured into cheese on farms, for which the Boards will have to assume responsibility, the same advances per gallon will be made. Details of the proposed arrangements will be found in the White Paper. The advances from the Exchequer are estimated to amount to about from £1½ to £1¾ million in the first year.

(2) For the purpose of launching a campaign for securing a purer milk supply, the Government will provide from public funds a sum not exceeding £750,000, spread over the next four years. It will be the responsibility of the Boards to continue the campaign without further assistance as soon as they are in a position to do so.

(3) The Government will be prepared to contribute from the Exchequer on a pound for pound basis to a milk publicity fund for a period of two years. The Government contribution will be limited to £500,000 in either year, according to the amount contributed by the Milk Marketing Boards. The grant will be contingent on the submission of an approved programme containing, *inter alia*, provision for the supply of milk to schools at reduced rates.

The requisite legislation will be introduced at an early date, and, in view of the widespread interest which is being taken in the subject, the Government hopes it will be facilitated by all Parties in this House.

Details of the Proposed Arrangements for Repayable Advances.

It is proposed that—

- (1) By means of repayable advances from public funds and for the two years beginning April 1, 1934, the Milk Marketing Boards should be guaranteed minimum prices of 5*d.* per gallon in summer (April—September) and 6*d.* per gallon in winter in respect of milk manufactured in factories in Great Britain.
- (2) For the same period, the Milk Marketing Boards should receive the same amount of repayable advance per gallon of milk manufactured into cheese on farms in Great Britain, for which responsibility will have to be assumed, as accrues to them in respect of milk manufactured into cheese in factories.
- (3) The rate per gallon of the advance to the Boards should be at a uniform rate determined monthly and should equal the excess of the minimum price per gallon of milk over the price* per lb. of imported cheese less 1½*d.* to cover the cost of manufacture.

* The price to be the average wholesale price per lb. of New Zealand Finest White and Finest Canadian White. One gallon of milk makes on the average one pound of cheese.

NOTES FOR THE MONTH

- (4) The sums advanced should be repaid under the arrangement in (5) below, during the two years from April 1, 1936, to March 31, 1938—any outstanding balance at the latter date to be finally accepted as a charge on public funds.
- (5) The rate per gallon of the repayment during the two years commencing April 1, 1936, should be determined monthly and should equal the excess of the price per lb. of imported cheese (defined as in the footnote to (3) above), over 6d. per gallon in summer and 7d. per gallon in winter. Thus, the areas between 5d. and 6d. in summer and 6d. and 7d. in winter will be "neutral zones" in which there will be no liability for repayment.

Examples showing how the System of Repayable Advances will operate in practice as regards Factory Milk and Milk made into Cheese on Farms respectively:—

Cheese in factories.

	<i>Summer.</i>	<i>Winter.</i>
(a) During Advance Period:—		
Minimum price	5d.	6d.
Realisation value (say)	3d.*	3d.*
Advance	2d.	3d.
(b) During Repayment Period:—		
Realisation value (say)	8d.*	8d.*
Minimum price for repayment purposes	6d.	7d.
Repayment	2d.	1d.

Cheese on farms.

(c) During Advance Period:—		
Realisation value (say)	4½d.	4½d.
Advance as in (a) above	2d.	3d.
Net returns to Board	6½d.	7½d.
(d) Repayment in respect of farm cheese milk would be at the same rate as for milk manufactured into cheese in factories—see (b) above.		

The Low Sugar-Percentages in 1933

THE following note has been communicated by Mr. J. H. Cock, B.Sc. (*Crop Observation Officer*), and Mr. R. W. Kettlewell, B.Sc. (*Supervisor*), of the Norfolk Agricultural Station, Sprowston:—

During the dry summer of 1933, the high record of sunshine and the low rainfall gave promise of exceptionally high sugar-percentages in the sugar-beet crop, even though the yield weight might be lower than usual. Early liftings in September, before the break-up of the dry period, raised expectations still further, since sugar-contents of over 20 per cent. were common. Then came the rain, and with it a rapid drop in sugar-percentage. Contrary to expectation,

* These figures would be the average wholesale price per lb. of New Zealand Finest White and Canadian Finest White Cheese, less 1½d.

NOTES FOR THE MONTH

therefore, the main crop, lifted later in the season, gave abnormally low sugar-percentages throughout the greater part of Norfolk.

Owing to widespread use of Klein E as a main crop strain, it was not unnatural that this particular strain was likely to receive criticism as being mainly responsible for the abnormally low sugar-content returned by the factory. In previous years, Klein E has rarely been outyielded in a wide range of variety trials, and although its sugar-percentage is lower than many other strains, it more than compensates for this in the yield of roots and sugar per acre.

In 1933, sugar-contents generally were much below average, and it became all the more important, therefore, to follow the development of Klein E during the lifting season. Periodic liftings were made at the Norfolk Agricultural Station, Sprowston, throughout the main-crop lifting season in order to compare the behaviour of a number of strains with Klein E. It was thus hoped to ascertain whether the unusually low sugar-content applied to Klein E only, or with equal or greater force to other strains in 1933, which was undoubtedly an abnormally bad season for sugar-percentages.

Lifting and analysis were carried out at weekly intervals from Nov. 9 to Dec. 21, on plots of Klein E, Klein N, Klein Z, Kuhn P, and Marsters, which had been drilled under identical conditions in the same field on April 20 and 21. The five strains dealt with are representative of types that, under normal conditions, range from high to low sugar-contents. Marsters and Klein Z are high sugar types, Kuhn P approximates to an intermediate type, Klein E is a low sugar-strain, but outstanding in yield, and Klein N between the E and Z strains.

Duplicate samples of 20 roots of each strain were lifted, topped and weighed, and the sugar-percentages determined in the washed beet.

1933.		AVERAGE SUGAR PERCENTAGE.				
Date.		Klein E.	Klein N.	Klein Z.	Kuhn P.	Marsters.
Nov. 9	..	15.7	16.1	16.5	16.7	16.6
15	..	15.7	16.3	16.3	16.7	16.3
22	..	15.9	16.0	17.5	17.1	17.1
29	..	15.7	16.8	17.2	16.9	16.6
Dec. 13	..	16.0	16.7	17.5	16.7	17.0
21	..	16.8	16.9	17.2	16.3	17.1

The results, which at first show as much as 1 per cent. difference between Klein E and the high sugar-strains, show no appreciable change in Klein E until late in the season,

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when the margin between this and the remaining varieties rapidly declines.

The general trend of the figures shows a tendency to increase to a peak point, after which the percentage remains stationary or declines. With Klein E, the peak was not attained last year until late in the season, so that the bulk of this strain was lifted before it had reached its highest sugar-percentage.

Comparison with similar figures of periodic liftings over the three years 1930-32, on four of the varieties, Klein E, N, Z and Marsters (*Journal of N.I.A.B.*, 1933), indicates that these four strains have behaved normally in relation to each other, but that in 1933 all strains have been at a lower level than is the average of three preceding years.

Thus it appears that the dry conditions obtaining in 1933 adversely affected all varieties by inhibiting normal development. The earlier varieties were naturally less seriously affected, and, on the advent of rain, had little further growth to make before reaching maturity.

As a strain, therefore, Klein E appears to have behaved normally in its relation to other strains, but the season of 1933, with its check in growth and subsequent prolonged autumn-growing period, has prevented Klein E from reaching its possible maximum sugar-content before the greater part of the crop was lifted.

To the grower, the difference in cash return was at the most 2s. 6d. per ton early in the season, when the sugar-percentages differed by 1 per cent., but at the end of the season had diminished to 1s. per ton, when Klein E was approaching maturity. These differences are at once compensated if Klein E can be relied upon to yield 1 ton of beet per acre over a 10-ton crop of any of the other strains, allowance being made for the additional cost of lifting, carting and delivering that extra ton to the factory.

The average yield of Klein E, at the Norfolk Agricultural Station, in main-crop variety trials of the National Institute of Agricultural Botany, during the three years 1930-32, has been 13.83 tons of washed beet per acre—10 per cent. better than Klein N and over 20 per cent. better than Klein Z. (*Journal of the N.I.A.B.*, 1933.)

In trials (1927-29) at the same centre, Klein E, yielding 11.98 tons per acre, had outyielded Marsters and Kuhn P. by 18 and 7 per cent. respectively. (*Journal of the N.I.A.B.*, 1930.)

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From yield trials, therefore, there is little doubt that Klein E is capable of attaining the extra crop weight necessary to compensate for a lower sugar-content over a number of varying seasons. It should be noted, however, that the trials at Sprowston were not lifted before Nov. 1 in any year.

Hence, it appears that the abnormal season is responsible for the general low level of sugar-percentages in all strains during 1933, and that Klein E, with its undoubted capacity for high yield, can more than compensate for a sugar-content below that of the other strains, when considered as a main crop. Its comparative value for earlier lifting is at present being investigated by the National Institute of Agricultural Botany.

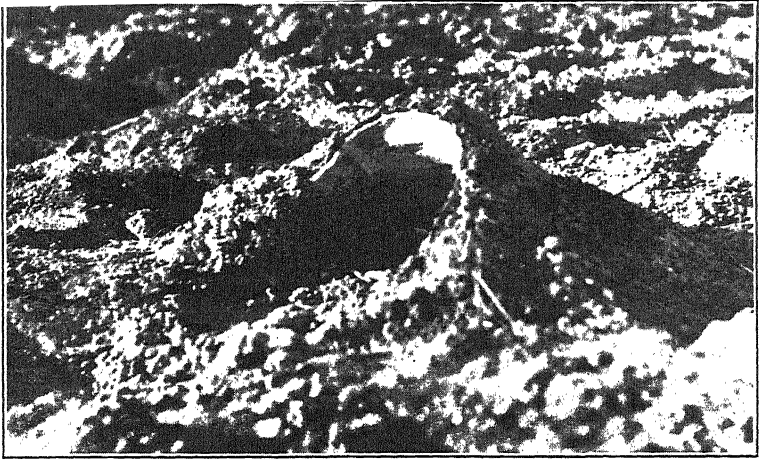
A Simple Method of Protection against Weather

THE following note has been communicated by Sir A. D. Hall, K.C.B., LL.D., F.R.S., Chief Scientific Adviser to the Ministry of Agriculture, and Director of the John Innes Horticultural Institution:—

On a recent visit to Andalusia I came across a somewhat primitive method of giving seedling tomato plants protection against frost and cold winds, which I have never encountered elsewhere nor seen described.

The country near Seville is largely planted with olives, which are spaced some 10 metres apart and severely pruned, so that they afford but little shade and permit of the growth of other crops below. These crops are very various—wheat and maize, peas and chickpeas and, on a considerable scale, tomatoes for canning.

The soil is a red or chocolate-coloured loam over limestone, and, towards the end of January, it is ploughed and then struck out in squares about 6 ft. on the side for the tomatoes. The soil is very dry, but about this time the rains are expected, though there is also the danger of a very cold north wind off the Sierras. In each square preparations are then made for setting out the young tomato plants, which have been raised in a rough shed close at hand. The labourer takes a large earthenware jar with tapering sides and a flat base about 5 in. in diameter. This he lays on its side in the middle of the square and mounds up the loose earth over the base of the jar into a cone about 18 in. in diameter and 10 in. high, the jar forming a sort of cave on the south side of the mound. The



A Shelter as constructed.



A Shelter with tomato plant in position.



Showing typical lay-out of the Shelters.
To face page 111

Photos: Sir A. D. Hall.

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labourer has also provided himself with leaves of the large Aloe (*Agave americana*), of which the hedges thereabouts are made—leaves about 15 in. long and 6 in. broad. One of these he fits over the jar under the lip of the earth so as to form a roof sustaining the soil when the jar is withdrawn. Thus he builds a little cave facing south, roofed over at the mouth by the aloe leaf where the soil is thin (Figs. 1-3).

The soil within the shelter is then broken up, a handful of well-rotted manure is worked in, and a tomato seedling about 4 in. high is planted out of the tin in which it has been raised. The cave forms a trap for the sun by day and maintains a favourable atmosphere for growth; at the same time the mound protects the plant from the dreaded north wind and from the occasional ground frosts. In a way the whole arrangement acts like a cloche, not so effective indeed, but self-regulating. Obviously it is a device only suited to a country where labour is cheap compared with materials.

Sampling Observations on Wheat

THE season 1933-34 is the second during which the full scheme of observations on the progress and yield of the wheat crop at selected stations has been in operation. Last year's results have already been summarized in previous issues of this JOURNAL (March, June, October, 1933, January, 1934). This year two new stations are taking observations, the Royal Agricultural College, Cirencester, and the East Sussex Agricultural Institute, Plumpton. There are therefore now ten stations in all, one in Scotland and the remainder distributed over the southern and midland counties.

The accompanying table summarizes the first quarter's observations of the current season. The stations are arranged in order of sowing date. The range of sowing date this year, October 16 to November 8, is considerably less than last year, October 11 to November 25. There is little correspondence between the order this year and that of last year.

The interval between sowing and appearance above ground, the chief event in the progress of the plant in the first quarter, shows, as last year, a correlation with date of sowing, early sowing being associated with quick germination. The interval ranges between 18 days at Cirencester and 36 days at Woburn; last year the interval ranged

NOTES FOR THE MONTH
SAMPLING OBSERVATIONS ON WHEAT 1933-34,
FIRST QUARTER.

Station	Variety	Sowing date	Appearance above ground		Plant density per 32 metres drill	
			Date	Standard error of difference	First count	Date
CIRENCESTER, Gloucestershire	Square Head's Master Yeoman	} Oct. 16	about Nov. 3	—	888† 1,132†	} Nov. 24
ROTHAMSTED, Hertfordshire	Square Head's Master Yeoman Victor		Nov. 6.75 Nov. 6.56 Nov. 4.50	} ±0.174	1,305 955 1,876	
PLUMPTON, Sussex	Square Head's Master Yeoman	} Oct. 20	Nov. 9.16 Nov. 8.06		789 1,032	} Nov. 29
SEALE HAYNE, Devonshire	Square Head's Master Yeoman Victor		about Nov. 8*	—	800 742 936	
WYE, Kent	Square Head's Master Yeoman	} Oct. 30	Nov. 22.12 Nov. 21.50	} ±0.206	1,013† 944†	} Dec. 15
BOGHALL, Edinburgh	Square Head's Master Yeoman		Dec. 6.94 Dec. 5.00		870 1,073	
NEWPORT, Shropshire	Square Head's Master Yeoman	} Oct. 31	about Nov. 27		524 536	} Dec. 15
LONG SUTTON, Hampshire	Square Head's Master Yeoman Wilhelmina		Nov. 25.06 Nov. 24.91 Nov. 20.22	} ±0.366	342 320 1,078	
WOBURN, Bedfordshire	Square Head's Master Yeoman Victor	} Nov. 6	Dec. 10.00 Dec. 14.81 Dec. 1—2		±1.436	} Jan. 8
SPROWSTON, Norfolk	Square Head's Master Yeoman Wilhelmina		Dec. 1.94 Nov. 30.88 before Nov. 30	} ±0.169		

* Square Head's Master significantly later than Yeoman and Victor.

† Based on 32 quarter-metre samples.

‡ Based on 32 three-quarter-metre samples.

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between 10 days at Seale Hayne (sown Oct. 17) and 37 days at Boghall (sown Nov. 9). Examination of the summaries of the temperature records at the various stations shows, as might be expected, that this interval is mainly a function of temperature, at least as far as the current year is concerned. At Woburn, for instance, the weekly mean soil temperatures 4 in. below the surface were 42.7, 38.8, 42.8, 36.3, 32.3, and 30.5 °F. for the weeks between sowing and appearance, and for Sprowston 43.8, 44.1, 44.9, and 41.1 °F. The warmer conditions of Sprowston during the first four weeks enabled the plants to become established before the frosts at the beginning of December. Similar contrasts and parallels occur throughout the table.

At all stations where the appearance was accurately determined, except Woburn, Yeoman appeared earlier than Square Head's Master. This difference was significant except at Rothamsted and Long Sutton, the anomalous difference at Woburn also being significant, as may be seen from the column of standard errors. The third variety, Victor or Wilhelmina, where grown, was significantly earlier than the two standard varieties. The standard errors given are, of course, only internal experimental errors applicable to comparisons between varieties at any one station (a difference of twice the standard error of the difference may be expected to occur by chance only 1 in 20 times). They do not include such variations as are caused by choice of site, depth of drilling, cultivations, etc., but they are an adequate standard by which to judge the technique. It is noteworthy that the present technique is capable of detecting with fair certainty differences in times of appearance between varieties of the order of half a day.

Cereals for Spring Sowing

THE following note has been communicated by the National Institute of Agricultural Botany, Cambridge:—

There are some things in the routine work of a farmer that he cannot plan or control—for example, the character of a season or the price of his produce. There are, however, other matters in which forethought may profoundly influence his financial returns; among these, not the least is the choice of variety and of seed for sowing. The difference in crop value between suitable and unsuitable varieties may be as much as 20 per cent. For more than ten years the National Institute of Agricultural Botany has carried out

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trials in the Midlands, and in the eastern and southern counties, the results of which are offered for the guidance of farmers. If they will use this information, and sow only clean seed of good germination after it has been treated with a fungicide, a good start will have been made towards securing excellent crops.

Spring wheat may sometimes be grown with advantage when the season is already too late for oats and there is no likelihood of obtaining a good crop of malting barley. For spring sowing the careful choice of varieties is most essential. Many failures of spring wheat crops in 1933 were due to the use of unsuitable varieties or mixtures of stocks. Autumn varieties should generally be avoided except for the earliest sowings up to the end of February, when Little Joss is likely to be as good as any of the spring sorts. During February and March the spring varieties Red Marvel (Japhet) or A.1 are suitable, but for the latest sowings, say mid-March to mid-April, the early maturing April Bearded is likely to give the best results.

Oat trials recently carried out over the whole country by County Agricultural Organizers have confirmed the merits of Golden Rain II for use where the crop is to be fed on the farm. Victory and Star also yield well and find a readier market owing to their white colour. Among the newer varieties Eagle in the 1933 trials has emphasized the promise it previously showed. Marvellous gives heavy crops of coarse grain, but it should not be sown after the middle of February.

Plumage-Archer 1924 and Spratt-Archer are by now deservedly the favourite malting barleys south of the Humber. Both will do well in all normal circumstances, but anyone who does not yet know Spratt-Archer should certainly give it a thorough trial. If very early ripening is important, Victory should be considered.

A leaflet describing these varieties can be obtained free of charge through County Agricultural Organizers or from the N.I.A.B., Cambridge. Whichever variety is chosen, early sowing always pays.

London Quarantine Station : Arrangements after March 31, 1934

THE recommendations of the Conference held on January 9, 1934, between representatives of the Breed Societies, the Royal Agricultural Society of England and

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the Ministry in regard to the future arrangements for continuing the London Quarantine Station for exported stock have now been approved by the Government. These recommendations include the transfer of the actual administration of the Station from the Royal Agricultural Society of England to the Ministry as from April 1, 1934, and certain increases in the fees charged in respect of animals entering the Station. The fees after March 31, 1934, will be (for the normal quarantine period of 14 days) as follows: for single animals, cattle £6 15s., pigs £4, sheep or goats £3 10s.; for each additional animal from the same premises of origin, cattle £4 5s., pigs £1 10s., sheep or goats £1. An additional charge (per animal) of 2 per cent. of the insured value will be made for cattle valued at £100 or over, of 1 per cent. for pigs valued at £40 or over, and of 1 per cent. for sheep or goats valued at £30 or over, subject to a maximum additional charge of £10 per head for cattle, and £1 for pigs, sheep or goats. The charge in respect of the transfer of the animals from the Station to the exporting vessel will remain as at present, i.e., 5s. per head for cattle and pigs and 2s. 6d. per head for sheep and goats.

All inquiries in respect of stock for entry to the Station after March 31 next should be addressed to the Secretary, Ministry of Agriculture and Fisheries, 7, Whitehall Place, London, S.W.1.

Agricultural Statistics, 1932 (Part II)

THE MINISTRY'S Annual Report on the prices and supplies of agricultural produce and requirements, relating to the year 1932-33, was published on January 29. The Report discusses the movements in prices and changes in sources of supply of the principal agricultural commodities in the year 1932, in comparison with those in previous years and part of the year 1933. The Report is of special interest inasmuch as trade in the last two years has been affected by import duties, quantitative regulation of imports, the Ottawa agreements, trade agreements with foreign countries and wide movements of foreign exchange rates.

The Report includes a detailed review of the scope of the various Acts, Orders and Agreements that have affected the importation and exportation of agricultural and horticultural commodities. In addition to the usual statistical tables of prices and imports, three appendices have been added showing in detail the period of operation, amount of

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duty and the allocations or restrictions on supplies imposed under the various trade agreements as far as these apply to agricultural produce and requirements.

Copies of the Report, which forms Part II of the *Agricultural Statistics, 1932*, may be purchased through any bookseller or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 1s. 6d. net or 1s. 8d. post free.

The International Trade in Dairy Produce

As the result of a resolution of the Economic and Monetary Conference of London, the International Institute of Agriculture, in agreement with the Section of Economic Relations of the League of Nations, and after consultation with the International Commission of Agriculture (Paris) and the International Federation for Dairy Products (Brussels) will hold in Rome a meeting of experts representing the countries specially concerned with the question. The meeting will take place on April 16 next, at the Headquarters of the Institute. The experts will be asked to consider whether it is possible and desirable to take international action to secure a better organization of production and of the international trade in dairy produce and, if so, on what lines such international action should proceed.

Expert representatives of the States more particularly interested in the problem, either from the point of view of their export trade or as large-scale importers, have been invited to take part in this preliminary meeting.

Licensing of Bulls

THE Minister has appointed a Committee to advise him on matters connected with the administration of the Improvement of Live Stock (Licensing of Bulls) Act, 1931, which will come into force in England and Wales on August 1, 1934. The Committee will consist of the following:—

Sir Merrik R. Burrell, Bart., C.B.E., *Chairman*.

Mr. B. J. Gates,	} Nominated by the National Farmers'	
Mr. J. H. Wain,		} Union.
Mr. T. Williams,		

Mr. F. H. Sanderson,	} Nominated by the National	
Rev. C. H. Brocklebank,		} Cattle Breeders' Asso-
Mr. J. H. Brigg,			} ciation.

The Secretary of the Committee is Mr. R. Ross, to whom all communications respecting the work of the Committee should be addressed at 8, Buckingham Gate, S.W.1.

SOME IMPRESSIONS OF BRITISH FARMING

II—SAMPLES OF THE NORTH COUNTRY

J. A. SCOTT WATSON, M.A.,
*Sibthorpian Professor of Rural Economy, University of
Oxford.*

Northumberland extends to something over a million and a quarter acres, and from certain points of view its agriculture is rather highly diversified. On the one hand it has a large proportion of mountain and heath, some of which is almost too poor even for Blackface sheep and is now, in parts, being afforested; on the other hand there is some exceedingly fertile land, both heavily stocked fattening grass and intensively farmed arable. Again, a good deal of agricultural land has been more or less ruined by the inevitable smoke and refuse heaps and subsidences associated with coal mining, though the bulk of the country is very attractive and quite unspoilt. There is heavy land and light, and many more contrasts that might be drawn. Yet there are several quite outstanding features in the farming of the county as a whole.

Live Stock.—Northumberland is sometimes held to be England's premier live-stock county. Perhaps this is too high a claim, for Cumberland has, on the whole, better types of the Clydesdale and of the Dual-purpose Shorthorn, while the Northumbrian pig industry is of no very great account. If we confine ourselves, however, to beef and mutton, and if we take as our standard of judgment the average quality of the sheep and cattle upon the ordinary run of commercial farms, Northumberland's claim would be hard to dispute; perhaps only Hereford could make a serious challenge. Specialization in the production of beef, mutton and lamb has steadily and markedly increased during the past generation, a fact that may be illustrated by the stock and crop statistics of the past forty years. Thus the total cattle herd of the county has increased as follows:—

1893	-	109,000
1913	-	134,000
1932	-	170,000

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This increase, amounting in gross to no less than fifty-five per cent., has applied to all classes of cattle, but the greatest advance (sixty-six per cent.) has occurred in the group of "other cattle, two years and over," i.e., in summer fattening beasts, while the smallest (forty-three per cent.) has occurred in "other cattle one year old and under two"—i.e. (in the main) stores. Dairying and breeding stock have increased by about fifty-four per cent.

Sheep, during the same period, have also increased, but the change in the composition of the flocks has been perhaps more striking than the rise in the total numbers. The statistics are:—

	<i>Ewes.</i>	<i>Other Sheep, One year and over.</i>	<i>Lambs.</i>	<i>Total.</i>
1893	374,000	226,000	414,000	1,014,000
1913	438,000	160,000	492,000	1,053,000
1932	487,000	149,000	564,000	1,200,000

Thus an increase of thirty-one per cent. in the ewe flock and of thirty-six per cent. in the number of lambs reared has been accompanied by a decline of thirty-five per cent. in the group of yearling sheep—due, of course, to the marketing of the finished product at an earlier average age. It is also worth noting that the average prolificacy of the ewes has risen during the period. The lambs enumerated in the June returns, per hundred ewes, have been as follows:—

1893-95	-	110
1912-14	-	112
1930-32	-	116

If we bear in mind that more than half of the sheep are kept under mountain and moorland conditions, where lamb crops of the order of eighty or ninety per cent. are all that the flockmaster expects, these figures represent a considerable achievement. Flocks of Half-bred ewes, kept under good conditions, of course reach very high figures: a crop of 160 lambs per hundred ewes is obtained as an average on the best farms.

The increase in the county's live stock, and the increased amount of feeding as opposed to the rearing of stores, is not, indeed, all clear gain; there has been a marked decline, concurrently, in the acreage of corn. The loss since 1893 has reached about 46,000 acres or very nearly half the original area. Barley-growing in particular has declined greatly—to just about a third of its former area. It is obvious, however, that the maintenance of an additional

IMPRESSIONS OF BRITISH FARMING—II

60,000 head of cattle and the production of an extra 150,000 lambs leaves a very large balance of net gain in output.

The broad explanation is that, since Somerville went to Armstrong College in 1891, a large part of the grass land of the county has been improved out of recognition. There were, indeed, some excellent natural pastures before that time, and there is a big area of very poor upland heath and hill that remains substantially as it was—and must so remain until some new system of improvement is discovered. Yet broad acres of middling store pasture have been turned into fattening grass, and the long leys, on the land that remains arable, now reach a level of productivity, and attain a length of life, that must have been undreamt of forty years ago.

It would be too much to ascribe the whole credit to Cockle Park, or to the work there of Somerville, Middleton and Gilchrist, but the lesson of Tree Field, on the use of basic slag, was the one foundation upon which the improvement was built, and the work that led to the compounding of the Cockle Park seeds-mixture was the other. In the areas where sheep are really thick upon the ground, and where there is a lower proportion of cattle, the practice is still to plough out and renew the grass, partly because the herbage itself deteriorates after a number of years, and partly because it is a great advantage, from the point of view of the wellbeing of the sheep, to have a proportion of clean fresh land.

Sheep.—Returning to the live stock, Northumberland has more sheep than any other English county, both in total and in relation to its whole area. The traveller from the south, however, is impressed less by the density of the sheep population than by the remarkable uniformity of their breeding over wide stretches of country. One sees nothing of that extraordinary mixture of breeds and crosses that is characteristic of the south and west Midlands. In Northumberland there are only five or six breeds, and five or six definite and recognized crosses, each made with an obvious and clear purpose in mind. It is not that the northern farmer does not experiment. Other than the standard breeds are tried from time to time. Nevertheless, no widespread change has been made since the beginning of the present century when the old "three-parts-bred" sheep (produced by two crosses of Border Leicester upon a Cheviot foundation) definitely went out, being replaced by

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Oxford and Suffolk crosses that were more suited to the changing taste of the consumer. At present the Hampshire is being tried against the Oxford and Suffolk as a cross for the Half-bred ewe, but it is too early to predict the outcome.

Cattle.—The cattle industry of Northumberland is many-sided. There is still some yard feeding, for instance along Tweedside, though a good deal less than in the days of four-course farming. The Galloway cow, suckling her blue-grey calf, is still a very common sight upon the uplands. On the better land a good many suckled Angus and Angus-cross calves are produced. As elsewhere, dairying has been spreading from the suburban areas to districts more remote from the consumer, and there are now numbers of fine Ayrshire herds besides the old-established Dairy Shorthorns. Perhaps the most interesting section is the fattening industry in the Alnwick area. Most of the raw material is imported, the bulk being Irish-bred Aberdeen-Angus heifers of the choicest class. The stores are bought at about eighteen months of age and mostly during the summer. They are got into forward condition before the end of the grass season, are wintered largely on hay and are got fit for the block quite early in the following summer. To sell prime fat heifers in May or June, without using cake or corn, is an ambition that is reached by a large proportion of the feeders. Until 1933 this scheme has been, upon the whole, very fairly successful financially, for it has enabled the feeder to avoid both the high cost of heavy yard-feeding and the glutted beef markets of the autumn. Last year, however, things went awry even here, for the "June rise" in beef prices never came.

The East Riding of Yorkshire is an area full of farming interest. It is as nearly devoid of other industries as any part of England; apart from the shipping and the seed-crushing industries of Hull, and a few seaside holiday-resorts like Bridlington, the people live by the land and have a fine tradition of efficient production.

Crops.—The fringes of the Riding show a great diversity of soil types. In the Holderness section there is much deep Boulder Clay producing a heavy but rich soil and yielding great crops of wheat. Along the Humber side is a narrow belt of warp land quite comparable

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in value to the silts of Lincolnshire. Round by Selby again most of the soil is alluvial or glacial sand, intensively farmed with potatoes, sugar-beet and carrots. The latter crop, indeed, is to be seen here on a larger scale than in any other part of the country. Carrot growing is at once a very laborious and costly and a wildly speculative industry. A twelve- or fifteen-ton yield and a price of twenty pounds a ton have been known to coincide, when a big field has brought a fortune. In other years, when the crop has to be thrown to pigs or cattle, the loss is very heavy. Further to the north there are some excellent loam soils, but turning round east again along the Vale of Pickering one strikes patches of sour wet "carrs" land which must remain practically useless until the time, if it arrives, when the drainage problem of the Derwent Valley will be solved.

The central mass of the Riding is formed by the Wolds, a nearly streamless chalk country rising in places to 600 and 800 feet. Like Northumberland, this is an area of large farms, carrying big flocks of sheep. The immense rectangular fields, and the isolated homesteads of many parts, tell of fairly recent enclosures from open sheep run, made largely by, or following the example of, the Sykes family of Sledmere. Planned originally for arable farming on the four-course system—corn and roots, corn and clover—these places have continued to be run on the same general system ever since. The four-course rotation was once described by a witty Irishman as the worst joke ever perpetrated upon the land of England: but here, until quite recent times, it has very well stood the test of experience.

The straw of the corn crops is trodden into manure by store or fattening bullocks, and the product is spread upon the clover ley after the latter has been eaten off by the ewes and lambs. The double dose of manure is no more than enough to produce a good yield of wheat upon the thin soil. Thereafter follows the root crop, mostly swedes and grown with artificial manure alone, which is partly folded off for the ewes and tegs and partly used for the wintering cattle. Then follows barley or oats with the clover seed to complete the round. The only common variation occurs on the deeper land, where three corn crops may be taken for each one of roots and clover, making the rotation a five-course.

The agricultural statistics for the East Riding show no broad changes like those for Northumberland. The wheat

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acreage of forty years ago has been more than maintained; barley has dropped a little these last few years, but another profitable season would probably be enough to restore the old allocation. Oats and roots have dropped, but by comparatively small amounts. Cattle numbered 91,000 in 1893 and 96,000 in 1932. The total sheep flock to-day is within a fraction of one per cent. of the total of 1893, a deficiency in the shearling group being just about balanced by an increase in the ewes and lambs. Such figures might lead one to conclude that farming was in a stable and reasonably satisfactory condition, but this would be far from the truth. Very heavy losses have been incurred, and by 1930 the bigger farms on the poorer land had become practically unlettable.

The difficulty has been to find any real alternative to the established system. A little land has been put down to grass, but basic slag and a Cockle Park mixture do not make a Northumbrian pasture on the Wolds. There are one or two experiments in mechanized corn growing, but experienced men are more than sceptical about the possibility of keeping the land in heart without its full quota of stock. Since 1922, when the writer first surveyed the Wolds, only two obvious changes have occurred. There has been a partial, but considerable replacement of horses by tractors, the bigger farms having generally two tractors, but four or five fewer horses than the old establishment. Unfortunately this change has been accompanied by a displacement of men, which is doubly regrettable because the farm worker of the Wolds is a very highly skilled and efficient man; indeed, it would be hard to find anywhere a body of men capable of getting through a bigger or better day's work upon the land. The other change is in the breeding of the sheep. In 1922 the flocks were practically pure-bred Leicesters from end to end. There is still a majority of Leicester ewes, but crossing with Oxford, Suffolk and Hampshire rams is now common. Many farmers would like to replace even the ewes with some other breed, for the aged Leicester ewe is a commodity hard to turn into money and even her cross-bred progeny are too big for most markets. Yet the Leicester has been very closely adapted to her particular environment, and seems to thrive upon her diet of winter roots and summer clover, and to stand the exposure, in a way that other breeds do not.

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For the rest the land is still remarkably well farmed. Great fields of clean, straight-drilled swedes, wonderfully bulky for the season, big corn ricks and fine bunches of lambs met the eye of the traveller everywhere last September. The depression has been met, in the main, not by change and reorganization, but by tightening the belt and setting the teeth. Sheep and corn the farming has been for a hundred years, and it is hard to see any alternative system that will extract so much from this particular kind of land.

West Lancashire.—A large part of Lancashire is an unattractive sight to the agriculturally-minded traveller. Much of the land is naturally poor, and much that might have been fair is poisoned and soured by smoke and fumes. But on the two western peninsulas, separated by the Ribble Estuary, one gets at last away from the dirty coal measures and the usually sour and rather barren Millstone Grits, on to the very different New Red Sandstone formation. Though geologically similar, these two areas, the Ormskirk district and the Fylde, present an interesting contrast in farming systems. In the former there is a preponderance of well-drained, free-working loams of good depth, and since there is also a very large local market there is every justification for intensive arable farming. The biggest individual source of income is of course the potato crop. Both second earlies and lates are cultivated, and, among many varieties grown, Great Scot would seem to be easily the most common. A good deal of land, too, is devoted to cabbage, brussels sprouts, broccoli, etc., upon a field scale. The oat crops are always heavy and often over-luxuriant. Even last year, despite the drought, there was some lodging. Wheat crops were of great bulk, but one almost doubted about the yield of grain when there was such a mass of straw. These, along with seeds-hay, are by much the most important crops, for the land is too rich for barley, and too valuable for growing many roots.

One of the problems of districts such as this is the loss of the city stables, on the one hand as a market for hay and straw and on the other as a source of manure. The growing of hay, indeed, has declined greatly, and the tendency is to do with smaller dressings of dung to the potato crop, making up for the deficiency with heavier dressings of artificials. Here, indeed, with a naturally moist soil and a rather high rainfall, the shortage of natural manures is not so serious

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a matter, and experiments have abundantly proved that really heavy dressings of dung are unnecessary and wasteful.

Talking with the older generation of small farmers in parts like Ormskirk one gets a clearer notion of the benefits of modern road-transport. Here in the old days the farmer or his son often had to turn out with a wagon at one or two o'clock in the morning, in order to be in Liverpool, with a load of produce, for the early morning market; reloading with stable dung, after baiting the horses, he would arrive back on the farm by noon, and generally find an afternoon's work still in front of him. Now the motor lorry calls on the farm at a comparatively reasonable time of day, and the farmer's concern is finished when he has helped to load up.

The Fylde is predominantly grass. The farms are small again, but very heavily stocked with dairy cows and with poultry. Many of their occupiers retail their own milk and eggs, and under such conditions it frequently pays to feed concentrates heavily and to carry a far heavier head of cattle than the land will naturally support. Again, the land is too valuable to be devoted to cattle rearing, and most of the cows are imported from Ireland or from the breeding grounds farther north. On the whole their quality is not very impressive, despite the reputation of Preston market for the quality of the dairy cows presented there. The output per acre from these farms must, however, run to a very high figure, and a hard-working man upon his fifty acres will doubtless have been far better off, these last dozen years, than many a thousand-acre farmer in Northumberland or on the Yorkshire Wolds.

SPRAYING WEEDS IN CEREALS WITH SULPHURIC ACID

L. D. MARTIN, M.A.

THE problem of controlling weeds in corn by quick, labour-saving methods, is becoming yearly of greater importance. A good many investigations have accordingly been carried out, and much research work has been done in recent years with various chemicals. Sulphuric acid has been given special attention, because this particular chemical is extensively used in France in the form of a fine spray to destroy weeds in corn. Recent statistics obtained from reliable authorities in France indicate that in that country approximately 520,000 acres are sprayed annually with sulphuric acid. In 1931 Messrs. Skilbeck and Coles, of the School of Rural Economy, Oxford University, went to France at the instigation of the National Sulphuric Acid Association, Limited, to investigate the process fully.* As a result of their visit to France experimental work was undertaken in this country in 1932 by Imperial Chemical Industries, Limited, at Jealott's Hill; the School of Rural Economy, Oxford; and the Institute for Research in Agricultural Engineering, Oxford University. The last-named published a technical report, in March, 1933, of the trials carried out under its control.

Progress has been rapid. In 1931 a few acres only were sprayed in this country, purely for experimental purposes; in the following year two horse-drawn machines were available and some 200 or 300 acres of corn were sprayed; whereas in 1933, in spite of a remarkable absence of Charlock in most parts of the country, 36 horse-drawn machines were kept in constant use and 5,570 acres were sprayed.

Sulphuric acid spraying was first used in this country exclusively for Charlock destruction, as data were not available regarding its effect on other weeds under the soil and climatic conditions prevailing in this country. During 1932 and 1933 every opportunity was taken to spray weeds other than Charlock, for experimental purposes, and the following list gives the results obtained with all weeds that have been the subject of special investigation.

* A report of their findings appeared in the *Scottish Journal of Agriculture*, October, 1932.

SPRAYING WEEDS WITH SULPHURIC ACID

YELLOW CHARLOCK (*Brassica sinapis*) is killed at all ages from the two-leaf stage to the time when the plant is in full flower. A 7 per cent. solution* (7 volumes of acid mixed with 93 volumes of water) is used at the rate of 100 gallons per acre. No difficulty has been experienced in obtaining a 90-100 per cent. "kill" provided spraying has not taken place before full seasonal germination.

WHITE CHARLOCK (*Raphanus raphanistrum*) is more resistant than the Yellow Charlock, and it has been found that it is necessary to use a 10 per cent. solution by volume at the rate of 100 gallons per acre to eradicate the weed. A 90-95 per cent. "kill" can be obtained.

SPURGEY (*Spergula arvensis*) is killed by using the same strength and quantity of solution as for Yellow Charlock. As this weed is normally associated with acid soils, an application of lime is also indicated and will probably lead to the steady reduction of the weed.

CORN BUTTERCUP (*Ranunculus arvensis*) requires a 13 per cent. solution to bring about an 85-95 per cent. "kill."

POPPIES (*Papaver* spp.) are difficult weeds to eradicate completely, but effective control can nevertheless be obtained if the spraying is carried out at the right time and with a suitable strength of acid. Further experiments are necessary to determine at what stage of growth the best "kill" can be obtained. The bulk of evidence indicates that the optimum period is when the poppy flower heads are bent over but have not actually burst into flower. Successful control has been obtained at earlier stages of growth. A 13 per cent. solution by volume should be applied at the rate of 100 gallons per acre.

CHICKWEED (*Stellaria media*), SCARLET PIMPERNEL (*Anagallis arvensis*), CLEAVERS (*Galium aparine*), GROUNDSEL (*Senecio vulgaris*), SPEEDWELL (*Veronica agrestis*), and other less common surface annuals can all be killed by using the strength and quantity of acid recommended above for Yellow Charlock.

It has been found that perennials, when present in arable crops, are also controlled to an extent that is of considerable benefit. A "leaf-kill" is obtained with deep-rooted perennials such as Thistles, Docks, Nettles and Coltsfoot. This partial check is of value in that it enables farmers to sow "seeds" where the growth of weeds would otherwise have made it impossible, and it further gives the corn an

* This refers to Brown Oil of Vitriol (77 per cent. H_2SO_4).

SPRAYING WEEDS WITH SULPHURIC ACID

opportunity of making sufficient recovery to smother new shoots as they may appear.

Gramineous weeds such as Couch, Wild Oat and Slender Foxtail (Black Grass), are not materially affected by the acid, and it is found that Fat Hen (*Chenopodium album*) is quite unaffected.

It will be seen that each species of weed needs special consideration, and the decision as to the strength of acid to be used, and the best time at which to spray, must depend upon the type of weed encountered, the climatic conditions prevailing at the time and the state of the crop.

Mixing and Application.—Brown Oil of Vitriol, which contains 77 per cent. of sulphuric acid, is the type of acid most generally used. The percentage strengths mentioned refer to volumes of B.O.V. made up with volumes of water. The acid is delivered to the farmer in 10-gallon carboys weighing, when full, about 200 lb. each, and containing approximately 170 lb. of acid. The usual method of mixing is to pump the requisite amount of water into wooden casks and to add the required amount of B.O.V. After stirring, the solution is ready to pump up into the machine. The dilution of sulphuric acid is supposed to be a process accompanied by some difficulty and danger. The dilute acid used for spraying is not dangerous but is destructive to clothes and machinery and painful to cuts and to the eyes. Actual experience, in France and in this country, shows that farm workers are quite capable of mixing the solution, and no accidents have been reported. *The acid, however, must be poured into the water and not vice versa.*

Machines.—The type of spraying machine most generally used is a complete sprayer on wheels operated by a pump driven off the axle, the spray being produced by pressure through spraying nozzles. All metal parts that come into intimate contact with the acid solution are constructed of an acid-resisting metal. Three years ago machines of this description were obtainable only from France, but are now procurable from several British firms at prices ranging from £43 10s. to £66 10s. By easy adaptation the machines can be converted into potato sprayers. A horse-drawn sprayer can average 16 acres a day under normal conditions, and as many as 20 acres have been sprayed by one machine in a single day. It is worthy of

SPRAYING WEEDS WITH SULPHURIC ACID

note that in spite of the abnormally dry summer in 1933 no instances were reported where spraying had to be cancelled owing to complete failure of water supplies. This is remarkable in view of the fact that it requires approximately 200 gallons of water an hour to keep a horse-drawn spraying machine supplied.

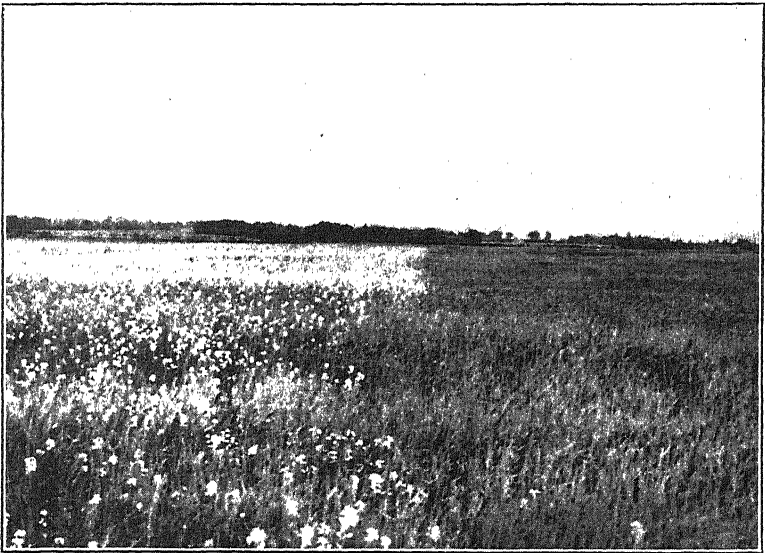
Action of the Spray.—The action of the spray has been found to start immediately it touches the plant, and the greater part of this action is over in a few hours, so that the process is almost independent of weather conditions. Toxic sprays are slower to take effect and may prove ineffectual if rain falls before this action is complete.

In 1933, plots of spring oats were laid out in order to test the relative efficiency of sulphuric acid and copper sulphate when under adverse weather conditions. These plots were sprayed with solutions of 6.5 per cent. sulphuric acid and 5 per cent. copper sulphate, and there was a heavy fall of rain two hours after the application of the solutions. This experiment served the purpose of showing that the rainfall does not materially affect the killing power of the acid, whereas the Charlock in the copper sulphate plots was almost entirely unaffected. Åslander in his researches some years ago showed that artificial rain applied one hour after treatment with acid, even with a weak solution, did not decrease the action of the spray. This experience was frequently encountered under normal field conditions in 1932, but less frequently in 1933 owing to the continued dry weather. The spray is, however, more effective if applied under dry and warm climatic conditions.

Sulphuric acid is not selective in its action. The differences in susceptibility to spraying between the cereal plants and certain weeds is dependent upon the differences in the physiology and morphology existing between the two species. Research has shown that, whereas the sulphuric acid solution is strong enough to penetrate the thin outer skin of some weeds and thus to kill them in a few hours after spraying, it is not strong enough to penetrate the stouter skin of the cereal plant. Further, the tender growing point of the cereal is protected by the wrapping round of the leaves so that acid cannot injure the cereal in the same way as weeds of which the tender growing point is exposed. Some doubt exists as to the exact nature of the destructive action of the spray. In practice, the field



FIG. 1.—Sulphuric Acid Spraying with a horse-drawn sprayer.



Photos: L. D. Martin.

FIG. 2.—Showing treated and untreated portions of a field.

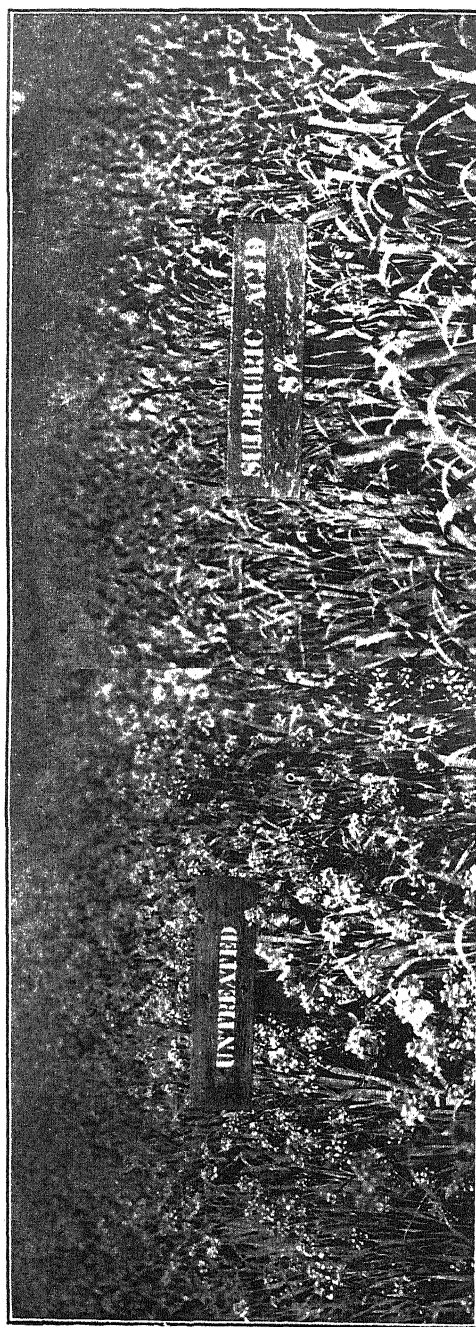


Photo: L. D. Martin.

Detail view of unsprayed and sprayed portions of a field.

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sprayed assumes a brown appearance an hour or two after spraying, owing to the destruction of the weeds and the scorching of the outside leaves of the cereal. A shower of rain shortly after spraying undoubtedly assists the crop to recover more quickly than if a prolonged drought follows.

The length of time taken by cereals to recover in 1932 and 1933 was carefully recorded, and it was established that on the average it was twelve days in 1932, whereas it was twenty days in 1933. This discrepancy in time is attributed to the long periods of hot, dry weather following spraying in 1933. This does not mean that harvest is delayed a corresponding number of days. Experience shows that, unless spraying has been deferred until the corn is in an advanced stage, harvest is not delayed.

Effect on Soil Acidity.—The question is frequently asked whether acid spraying tends to make the soil "sour," and having regard to the importance of this aspect of the matter special investigation has been made. Results show that the change in the acidity of the soil is so small, if indeed it exists at all, that no increase of lime is required beyond the amount that would normally be applied in the ordinary course of good husbandry. The normal application of 7.0 gallons B.O.V. per acre requires only 58.7 lb. of carbonate of lime to neutralize it.

Brioux found that the souring effect of acid spraying lasts a few hours only in calcareous soils, and five days in heavy clays and neutral soils, and that in light sandy soils there may be a definite fall in pH values. No adverse soil effects were observed by Muskett, who used a 2½ per cent. solution at the rate of 4,840 gallons per acre to control certain diseases and weeds in nurseries in Northern Ireland. This application represents a dressing of ten times the quantity normally used for weed eradication on farms. All available evidence indicates that the treatment of soil in the absence of weeds does not increase the solubility of potash, phosphorus, lime or nitrogen, and the increase in yield from a sprayed crop is attributable mainly to the absence of weed competition and not, as is sometimes thought, to the liberation of additional supplies of plant food in an available form.

Sulphuric acid has no deleterious effect on the productivity of the soil, and Canadian experiments show that the slight detrimental effect on the soil biological activity

SPRAYING WEEDS WITH SULPHURIC ACID

observed as a result of sulphuric acid application is too small to need consideration. It is safe to spray 36 hours after sowing grass and clover seeds in corn and, further, if the "seeds" have already been sown, spraying can safely be carried out for a few days, i.e., before the first seedlings have appeared above the ground.

Samples of sprayed and unsprayed barley have been submitted for tests in order to determine their relative quality for malting purposes. These tests have shown that spraying in no wise injuriously affects the sample; indeed, parcels of sprayed corn subsequently sold off the farm have, in most instances, commanded a higher price, apart from any increased yield that may have been obtained.

It is significant also that crops that have been sprayed in this country have seldom "lodged" and are noticeably stiffer in the straw.

Costs.—In this country, as in France, a great deal of spraying is carried out on a contract basis, i.e., the contractor supplies a suitable machine and the acid, and sends a skilled man to superintend the work. The usual charge made is about 15s. per acre. The farmer has to supply water and a man and horse for the machine. When a farmer undertakes the work, using his own machine, the cost varies from 7s. 6d. to 10s. per acre, depending to a large extent on the distance of the farm from the nearest source of acid supply, and the proximity of the field to be sprayed to a water supply. A representative example of the cost is given under average conditions:—

Depreciation:		<i>Per Acre.</i>	
Cost of machine and plant, £52			
Life of machine, 4 years			
Acres sprayed per annum, 150	.. ..	1s.	9d.
Cost of acid, including freight	.. ..	5s.	0d.
Labour:			
3 men, 2 horses	.. ..	1s.	6d.
Area covered in a day—15 acres		8s.	3d. per acre.

Length of Spraying Period.—The length of the spraying period in this country may be taken as 6-7 weeks, i.e., April 25 to June 10.

Results.—Surveys conducted in recent years have only served to emphasize the wide distribution of weeds and the enormous annual losses incident to their presence. The depressing effect that Yellow Charlock and Runch may have on the yield of cereals is shown by the results of

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replicated experiments carried out in 1932-33 by Imperial Chemical Industries, Limited, at their Research Station at Jealott's Hill, and at an outside centre in Oxfordshire:—

	Yield of Grain per acre cwt.	Increase per acre over Untreated cwt.	Increase over Untreated per cent.	Extent of Control per cent.
<i>Jealott's Hill*:</i>				
Yellow Charlock in Oats, 1932				
Untreated	18.0	9.75	54.16	95
Treated with dilute sulphuric acid ..	27.85			
<i>Oxfordshire:</i>				
White Charlock in Barley, 1933				
Untreated	10.52	7.84	74.52	91
Treated with dilute sulphuric acid ..	18.36			

In general, the increases in yield obtained were not so marked in 1933 as in 1932. This is attributed entirely to the long spells of hot, dry weather that usually followed spraying in 1933.

The 1932 experiment on the control of Charlock showed that the amount of phosphoric acid and potash removed from the soil by the Charlock corresponded to $\frac{1}{2}$ cwt. super-phosphate and $1\frac{1}{4}$ cwt. kainit per acre.

Conclusion.—Certain annual weeds are killed in corn by spraying with solutions of sulphuric acid varying in strength from 7 to 13 per cent. according to the particular weed encountered. The solution is applied, in all instances, at the rate of 100 gallons per acre. Increased yields are obtained if the crop is sprayed at an early stage, these increases being proportional to the degree of weed infestation. Perennial weeds are not permanently affected by the action of the acid, but receive a severe check that enables the corn to make sufficient headway to smother new shoots.

The effect of the acid on soil acidity varies with the type of soil involved, but in all cases is so small that it does not require any special application of lime in addition to that which otherwise is considered necessary.

Experimental work continues in an endeavour to determine the correct strengths of acid to use and the right time to apply the solution to weeds other than those that have not already been the subject of special investigation.

* The thanks of the author are due to the Controller of the I.C.I. Agricultural Research Station, Jealott's Hill, for permission to quote these results, which are to be published in full elsewhere.

AN AUXILIARY METHOD OF COMPARING THE VALUES OF SIMILAR COMPOUND FERTILIZERS

W. GAVIN, C.B.E., M.A.,

THE few notes that follow are meant to assist in the comparative valuation of two compound fertilizers of similar plant food ratios.

The farmer has alternative courses: he can buy the necessary ingredients and mix them himself, or he can buy a compound fertilizer. There is no doubt that it will always cost more to buy a compound fertilizer than to mix the ingredients oneself; whether it is always advisable to take the cheaper course must be decided by each man for himself.

Assuming that a farmer has decided to purchase compound fertilizers, the usual method of comparing one with another is to work out the value of the constituents from the unit values. For example:—

1. *Potato Manure No. 1.*

6 per cent. Nitrogen (N).

8 per cent. Phosphoric acid (P_2O_5), water-soluble.

10 per cent. Potash (K_2O), as sulphate of potash.

Price £7 10s. per ton, delivered on the farm.

2. *Potato Manure No. 2.*

9 per cent. Nitrogen (N).

11.5 per cent. Phosphoric acid (P_2O_5), water-soluble.

12 per cent. Potash (K_2O), as sulphate of potash.

Price £10 per ton, delivered on the farm.

Now present unit values are approximately:—

N (in sulphate of ammonia)	7/-
P_2O_5 (water-soluble, in super)	4/-
K_2O (in sulphate of potash)	4/6d.

Comparison.		Value in Shillings.			Value in Shillings.
1. 6% N	× 7/-	= 42	2. 9% N	× 7/-	= 63
8% P_2O_5	× 4/-	= 32	11.5% P_2O_5	× 4/-	= 46
10% K_2O	× 4/6d.	= 45	12% K_2O	× 4/6d.	= 54
Total ..		119/-	Total ..		163/-

Price 150/-: therefore the sur-
charge for mixing, etc., is 31/-
per ton.

Price 200/-: therefore the sur-
charge for mixing, etc., is 37/-
per ton.

At first glance, the comparison shows that No. 1 fertilizer is the better value, since the charge for mixing, bags and

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delivery is only 31s. per ton as compared with 37s. per ton. So far so good, but the object of buying a compound fertilizer is to get *plant food*, not a ton of material, on to the land as cheaply as possible.

An alternative method of valuation is therefore here suggested, which may be termed valuation by *fertilizer price units*. Consider first the fertilizer No. 1. The total value of the plant foods in a ton of this compound is 119s. : if this total is divided by 7s. (the unit value of nitrogen), a figure of 17 is the result and we can say that No. 1 fertilizer contains 17 units (all expressed as nitrogen) per ton. These units may well be called *fertilizer price units* (F.P.U.'s), since by this means all the plant foods have been brought to the common basis of nitrogen according to their respective market prices. If the price per ton of the fertilizer (150s.) be divided by the number of F.P.U.'s we get the price of 8s. 10d. per F.P.U.

Repeat the process with No. 2. It will be found that there are 23.3 fertilizer price units (163 divided by 7) per ton, and that the price is 8s. 7d. per F.P.U. (200s. divided by 23.3). Now the F.P.U. represents a fixed value in fertilizer plant food, so that really No. 2 fertilizer (8s. 7d. per F.P.U.) is better value than No. 1 (8s. 10d. per F.P.U.), although the first calculation indicated that No. 2 was the worse. The reason for the difference is that by using the method of Fertilizer Price Units, the charge for mixing, bags and delivery is spread over the plant food content of the mixture, so that the price per F.P.U. is a real measure of the value of the fertilizer.

After one or two trials, the calculation becomes very easy, and a table is appended giving the necessary factors at present market prices, thus enabling the calculation to be made direct from the percentage of each ingredient.

The only warning, which must not be disregarded, is that this method should be used for comparing *similar* mixtures and not, for example, as the sole criterion of the respective values of sulphate of ammonia and kainit, or of compounds of very different composition. With this reservation, the use of this method can be recommended as providing a simple way of reaching a true valuation, as between one compound fertilizer and another.

In order to shorten the calculation referred to above, the following table has been compiled, from which can be taken the factors necessary to multiply the percentage of each

COMPARING VALUES OF COMPOUND FERTILIZERS

ingredient in order to obtain in one operation the F.P.U.'s of any fertilizer. This table is based on present market prices of fertilizers (January, 1934):—

<i>Ingredient.</i>	<i>Factor.</i>
Nitrogen	1'00
Water-soluble phosphoric acid ...	0'57
Insoluble phosphoric acid ...	0'29
Potash (in 30 per cent. potash salts)	0'51
Potash (in sulphate of potash) ...	0'64
Potash (in muriate of potash) ...	0'56

Example.

Potato Manure No. 2 (see above).

<i>Ingredient.</i>	<i>%</i>	<i>×</i>	<i>Factor.</i>	<i>=</i>	<i>F.P.U.</i>
Nitrogen	9	×	1.00	=	9.0
Water-soluble phosphoric acid ..	11.5	×	0.57	=	6.6
Potash (in sulphate of potash) ..	12	×	0.64	=	7.7
Total ..					<u>23.3</u>

THE VALUE OF GRAZING FOR PIGS

H. E. WOODMAN, M.A., Ph.D., D.Sc.,
School of Agriculture, Cambridge.

A COLLEAGUE of the writer stated recently that although, under conditions of commercial pig-breeding, 10 to 15 in-pig sows will keep about 4 acres of good grass closely-grazed all the year round, the shortest of grass being readily bitten off, yet it has always been found necessary, even when grass is abundant, to feed at least 4 lb. of meal per head to maintain the animals in good condition. The question, therefore, arises as to the contribution that pasture grass makes towards the maintenance and productive processes in the pig, and the answer to this question clearly depends on the extent to which pigs are able to digest the constituents of the herbage.

With the object of securing information on this subject, the writer and his colleagues recently carried out a number of digestion trials, in which the capacity of Large White bacon hogs to digest young grass was determined. An account of this investigation was published in *The Journal of Agricultural Science* for January, 1934, and readers are referred to that paper for a fuller account of the technical details than can be given here. In the first trial, the digestibility of a basal ration, composed of equal parts of maize meal and middlings, was determined. In the two following periods, the amount of basal food was cut down to an appropriate level, and definite weights of the grass to be tested were added. In period 2, very short, leafy grass, containing, on the basis of dry matter, 26.0 per cent. of crude protein and 16.7 per cent. of crude fibre, was used; while somewhat older grass, containing 16.8 and 19.4 per cent. of crude protein and fibre, respectively, was fed in the third period. It will be noted that only young grass was used in the trials, since, if grass is to be fed as an essential energy- and protein-contributing component of a pig's diet (and not merely in small amount to supply certain accessory factors), then it should be utilized in its young stages of growth. There can be no doubt whatever as to the low feeding value of mature and partially-lignified herbage for pigs.

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Although the pigs had never received grass in any form before this experiment, they displayed, from the outset, considerable eagerness for this portion of the ration. During both periods, they seemed perfectly healthy and contented. The dung was of satisfactory consistency, being slightly softer than when the pigs were on meal only. It was greenish in colour, and the presence in it of unassimilated residues from the grass was easily detected.

Results of Digestion Trials.—In Table I are summarized the digestion coefficients for the basal ration of maize meal and middlings, and for the two grades of pasture herbage. It should be noted that the digestion coefficient of a feeding-stuff constituent is the number of parts of that constituent digested per 100 parts consumed.

TABLE I.—SUMMARY OF DIGESTION COEFFICIENTS.

	<i>Period 1.</i>		<i>Period 2.</i>		<i>Period 3.</i>	
	<i>Basal Ration</i>		<i>Pasture Grass</i>		<i>Pasture Grass</i>	
	<i>(Equal parts</i>		<i>(Containing</i>		<i>(Containing</i>	
	<i>of maize meal</i>		<i>26.0 per cent</i>		<i>16.8 per cent.</i>	
	<i>and</i>		<i>crude protein</i>		<i>crude protein</i>	
	<i>middlings).</i>		<i>and 16.7 per</i>		<i>and 19.4 per</i>	
			<i>cent. crude fibre</i>		<i>cent. crude fibre</i>	
			<i>on D.M. basis).</i>		<i>on D.M. basis)</i>	
	<i>per cent.</i>		<i>per cent.</i>		<i>per cent.</i>	
Crude protein	84.1	..	66.6	..	55.0	..
Crude oil	80.7	..	—	..	—	..
Carbohydrate	88.6	..	71.2	..	68.9	..
Crude fibre	30.4	..	56.9	..	55.4	..
Total organic matter ..	84.6	..	61.9	..	60.3	..

It is clear, from the data in Table I, that the pigs, which averaged about 195 lb. live weight during the periods of grass-feeding, were unable, with the sole exception of the fibrous component, to digest the constituents of even young grass with anything like the degree of efficiency shown in the digestion of the ration of middlings and maize meal. As regards the oil fraction, the grass not only failed to supply any digestible oil, but also appeared to depress the digestibility of the oil in the meal fed along with the grass. The digestion coefficients of the total organic matter are the best criterion for assessing the relative digestibilities of the pasture and the mixed meal. It will be noted that the pigs were able to digest about 85 per cent. of the organic matter of the meal, and only 60 to 62 per cent. of that contained in the grass. A further interesting observation is that the constituents of the older grass, used in period 3, were not, with one exception, notably less digestible than those

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of the very young grass of period 2. Only in the crude protein was there any appreciable difference: the protein in the older grass, besides being smaller in amount, was also significantly less digestible.

The data in Table II show the amounts of digestible nutrients available to pigs per 100 lb. of the mixed meal and per 100 lb. of the two grades of pasturage. It should be emphasized that the figures, in every instance, relate to 100 lb. of the dry matter of the foods.

TABLE II.—DIGESTIBLE NUTRIENTS AVAILABLE TO PIGS
PER 100 LB. OF FOOD (DRY MATTER BASIS).

		<i>Period 1.</i>		<i>Period 2.</i>		<i>Period 3.</i>	
		<i>Basal Ration</i>		<i>Pasture Grass</i>		<i>Pasture Grass</i>	
		<i>(Equal parts</i>		<i>(Containing</i>		<i>(Containing</i>	
		<i>of matze meal</i>		<i>26.0 per cent.</i>		<i>16.8 per cent.</i>	
		<i>and</i>		<i>crude protein</i>		<i>crude protein</i>	
		<i>middlings).</i>		<i>and 16.7 per</i>		<i>and 19.4 per</i>	
				<i>cent. crude fibre</i>		<i>cent. crude fibre</i>	
				<i>on D.M. basis).</i>		<i>on D.M. basis).</i>	
		<i>per cent.</i>		<i>per cent.</i>		<i>per cent.</i>	
Digestible	protein	12.24	..	17.34	..	9.22	
do.	oil	4.46	..	—	..	—	
do.	carbohydrate ..	63.77	..	31.85	..	36.26	
do.	fibre	1.51	..	9.52	..	10.76	
do.	organic matter	81.98	..	58.71	..	56.24	

Table II shows that 100 lb. of the dry matter in the meal ration supplied the pigs with as much as 82 lb. of digestible organic matter (including 12.2 lb. of digestible protein), whereas the very young grass, supplied in period 2, provided, per 100 lb. of dry matter, only 58.7 lb. (containing 17.3 lb. of digestible protein), and the somewhat older grass, in period 3, furnished 56.2 of digestible organic matter (including 9.2 lb. of digestible protein). Averaging the results of periods 2 and 3, it may be concluded that 100 lb. of the dry substance in young grass furnishes 57.5 lb. of digestible organic matter for purposes of maintenance and production in pigs. From the foregoing results, and assuming, in the meal and grass, a moisture content of 12 and 80 per cent. respectively, it may be shown that, from the standpoint of supply of digestible organic matter, 1 lb. of the mixed meal is equivalent to 6.3 lb. of fresh young grass herbage.

Practical Conclusions.—The results of this investigation point to the conclusion that the consumption of 6 to 7 lb. of young grass should enable a saving of 1 lb. of meal to be

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effected. According to Mr. W. A. Stewart's estimate, however, a 6-months-old pig will not eat more than 12 to 14 lb. of green food per day. It is clear, therefore, that such an allowance of grass, *even in its young and most highly digestible condition*, is not equivalent to more than 2 lb. of meal.

If satisfactory rates in live-weight increase of growing pigs on grass are to be obtained, it is obviously essential that the animals should receive, in addition to the grass, an adequate ration of concentrated meal. Indeed, when grass forms a high proportion of the dietary of pigs, it is not feasible to expect such a rapid live-weight increase as is possible with indoor-fed pigs receiving rations composed wholly of such concentrated and easily-assimilated foods as barley meal, maize meal, middlings, fish meal, etc. Not only is the grass much less digestible than the meal, but it is a bulky food from the standpoint of the pig, and must tend to restrict the weight of food, in terms of dry matter, that the animal can consume in a day. The results of the present experiments suggest, further, that the herbage in the diet may actually depress, to a small extent, the digestibility of the meal fraction, a depression that might become serious if the pigs were allowed to consume grass without restriction. It may be noted that, in the period when the meal alone was fed, the pigs averaged a mean daily gain of about $1\frac{1}{2}$ lb. This fell to about $\frac{2}{3}$ lb. after introducing the herbage, which formed, on the dry matter basis, 20 to 30 per cent. of the total ration.

A further important point should be taken into consideration when dealing with the rationing of pigs that are allowed freedom for grazing, namely, that a very definite amount of energy is expended in roaming about and in biting off and masticating the grass. The energy used up in such muscular activity will be much greater than is expended by sty-fed pigs under reasonably good conditions of management. For this reason, the *net* contribution of the grazed herbage towards the upkeep of the animal is probably significantly smaller than is represented by the conclusion drawn from the results of these experiments (that 6 to 7 lb. of young grass is equivalent to 1 lb. of meal).

Grass in a more advanced stage of maturity will presumably have a still lower value for pigs, and more than 6 to 7 lb. will be required to replace 1 lb. of ordinary pig meal. In such circumstances, it is probably safe to base conclu-

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sions on Mr. W. A. Stewart's estimate, and to regard 8 to 10 lb. of such grass as being equivalent to 1 lb. of meal.

It must be concluded, therefore, that when rapid progress is looked for in growing and fattening pigs, grass, even in its young growth, should not form more than a moderate proportion of the ration. As regards in-pig sows being permitted unrestricted grazing, the herbage so secured (say 12 to 15 lb.), if young grass, should be looked upon as furnishing the equivalent of no more than about 2 lb. of meal; and, if more mature grass, about $1\frac{1}{2}$ lb. Indeed, in view of the energy expended by the sows in grazing and moving about, it is probably safer to assume that these figures overstate the case for grass.

The investigations at Cambridge have demonstrated clearly the all-round superiority of young grass as a source of digestible nutrients for sheep (and other ruminants) as compared with pigs. It has been shown, for example, that 100 lb. of the dry substance in such herbage furnishes ruminant animals with 75 lb. of digestible organic matter as against 58 lb. in the case of pigs. The latter are clearly unable to utilize young grass with the degree of efficiency manifested by sheep and cattle.

In conclusion, it should be pointed out that no attempt has been made to emphasize the beneficial effect on health of allowing pigs a free run on grass land. This aspect of the question has been dealt with in numerous other articles, and the writer has purposely restricted the scope of the present note to the consideration of new data that enable a quantitative expression to be made of the food requirements of grazing pigs.

YOUNG FARMERS' CLUBS

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WHAT is a Young Farmers' Club? It is a group of boys and girls between the ages of 10 and 21, banded together with the common object of caring for some living thing—a calf, a pig, chickens, or plants in a garden plot. In pursuance of this common object each member undertakes to care personally for the stock or plants allotted, to keep accurate records, to attend the meetings, and to take part in all the organized activities of the club.

The movement first assumed importance in America and Canada, and it is little more than a decade since Young Farmers' Clubs as we know them were founded in this country. In the early years the movement owed a great deal to the late Lord Northcliffe and to United Dairies, Ltd.

At an earlier period, a number of clubs or associations of an agricultural nature—known as Young Farmers' Clubs—were established in some districts. These were generally confined to farmers and farmers' sons, admitted adults to full membership, and did not necessarily keep stock. Such societies, many of which exist to-day, fulfil a useful purpose and are doing excellent work.

The modern development—with which this article deals—was fostered by the Ministry of Agriculture and Fisheries, which, in 1924, appointed an Organizer to assist in the establishment of new clubs.

In 1928, with financial help from the Ministry, the National Council of Social Service undertook the central administration, and set up an Advisory Committee. This latter, together with representatives from the then existing clubs, formed the National Association of Young Farmers' Clubs in the following year. Increasing membership brought its own problems, and necessitated a larger Headquarters Staff, including two additional Organizers; and, in 1931, this became possible, thanks to continued generous help from the Carnegie United Kingdom Trust. A little later the constitution was amended and the present National Federation—to which the great majority of clubs are affiliated—came into being.

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At the present time (January, 1934), there are 188 clubs in England and Wales, with a total membership of nearly 4,000 boys and girls. From the north to the south, from the east to the west, the strength of the movement has grown appreciably during the past twelve months, an encouraging feature being the establishment of new clubs in many areas. Their distribution is interesting, and it will not be surprising, to those who have recognized the possibilities of the work, that the counties in which clubs are strongest are usually those where the rearing of stock, or the production of milk or poultry, is a predominating feature.

Of the 35 counties in which clubs have been formed, Yorkshire, Devon and Kent head the list with 20 each, closely followed by Durham, Essex and Northumberland, all of which have 13 or over. No clearer indication could be given of their general appeal. In justice to other counties, however, where the club spirit is just as keen as in those mentioned above, it is only fair to say that a mere statement of the number of clubs does not give a complete picture of the strength of the movement in any particular area, a fairer comparison being the actual number of stock-keeping members. In some districts, to suit local needs, organization has taken the form of a comparatively small number of clubs, each with a large membership; some of the latter have as many as 40 to 60 members.

In Northern Ireland, as might be expected in such a stock-rearing area, a firm hold has been established, and here the Farmers' Union were the sponsors. Several clubs have been formed in Scotland and others are being planned in suitable districts.

In the 188 clubs mentioned above, calves, poultry and pigs are the most popular stock, followed by rabbits, horticultural plots, bees and sheep. Some clubs confine themselves to one form of stock only, or possibly two, e.g., calves and pigs, pigs and poultry, and such a policy has much to commend it. Past experience has shown it to be a mistake to allow individual members of the same club to care for several different types of stock, e.g., calves, pigs, rabbits and bees; under such conditions efficient management is difficult, and, in practice, the best results are not likely to be obtained.

To give greater detail:—110 clubs keep calves, 48 poultry, 23 pigs, 19 horticultural plots, while the remainder devote their attention to sheep, rabbits and bees. The last

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two forms of stock are more particularly appropriate for what are described in some districts as "Junior" clubs (run in connexion with a school), as opposed to "Senior" clubs for larger stock. Further mention will be made of these later.

Personnel.—Although differing considerably in details of management and in methods of working, certain features are common to all. The main body of a club consists of the stock-keeping members, and, in the case of a garden club, plot-holders. The members elect from among themselves their own chairman, secretary, and treasurer—to hold office for one year—and conduct their own meetings. An adult acts as a club leader, and it should be his duty to examine and correct the record books, pay sufficient visits to stock and crops to exert efficient supervision, and generally be a guide, philosopher and friend. There is, further, a small adult advisory committee, usually consisting of representatives of local landowners, farmers, and other interested persons, or sometimes a sub-committee from the local branch of the National Farmers' Union. Its principal duty is to supervise the purchase and sale of stock, to watch over the finances of the club and to arrange loans, while it also assists generally in matters of policy or when items of special difficulty arise. In addition, most clubs allow honorary or associate members to join, on payment of a small annual fee; these latter may be adults, parents, etc., who may attend club meetings and take part in discussions with the permission of the chairman, but may not vote.

Practical Activities.—It is essential to emphasize the fact that each member is taught to regard the task undertaken as a business enterprise and not, as is sometimes thought, a pleasant, spare-time occupation or hobby. This aspect is continually stressed.

The quality of stock reared, exhibited and sold by Young Farmers has shown a consistent improvement; this is partly due to increased efficiency as a result of the training received, and partly to the better type of animals or chickens now allotted. From every point of view, advisory committees are finding it well worth while to buy only really good stock of the type selected, although the initial cost may be higher. The boys and girls—not to mention the parents—are critical observers.



Photo : Sport and General.

FIG. 1.—The Misses Phyllis Neale and Winnie Lee, of the Horsham Young Farmers' Club, with "Corbin's Daisy" and "Choice Dolly Dimple," which fetched 42 and 44 guineas, respectively, at the English Guernsey Society's sale, October, 1933.



Photo : Associated Press.

FIG. 2.—A "Young Farmer" and his stock.



Photo : Western Daily Press and Bristol Mirror.

FIG. 3.—Sodbury Vale Young Farmers' Club. Hedging practice.



Photo : G. G. Garland.

FIG. 4.—A Young Farmers' Club Show of Stock.

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Instruction in judging the various forms of stock is given in nearly all clubs, and this is one aspect of the work with which the general public is most familiar. Not only has the judging to be done, but reasons have to be given to justify the decisions made, a very valuable point. Most of the leading agricultural show societies hold such competitions.

Club activities are numerous, but mention ought to be made of the value of organized visits to well-managed farms in the district, or to the nearest Farm Institute or Agricultural College, in helping members to assess the worth of the different methods seen, and in developing an inquiring and open mind.

Record books are kept by members, details of feeding and management being entered, together with the costs, and this is regularly checked by the Leader. It is a good plan for the latter to use the current entries in the books, at each meeting, as the basis of a brief discussion on the proper care of the stock concerned at that period. Much useful information, particularly on feeding costs, has already been derived from a study of such records.

Club meetings are usually held monthly, and, as indicated above, are conducted by the members themselves. The election of new officers each year, whenever possible, can be recommended, as it enables more members to gain useful experience and assists in maintaining interest. The improvement in ability of expression, and in the development of self reliance, after a period of club work and attendance at meetings, must be seen to be believed.

General.—To ensure success, it is very necessary that those responsible for starting a club shall see that they are on sound lines; this really means satisfying themselves that the area to be covered is capable of supporting the type of club contemplated and that the right type of stock is recommended. Unfortunately, these precautions have not always been observed in the past, and disappointment has resulted.

In out-of-the-way districts, where transport facilities are not too good, a small club, with members drawn from a fairly circumscribed area, is likely to give the best results. On the other hand, where the farms, centred round a fair-sized market town, are small or comparatively small, a club of larger membership and covering a wider area, may be set up. For clubs confined to one village, pigs and poultry are appropriate.

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It is also a good rule to issue a type of stock with which most of the parents of members are familiar. Instances could be quoted in which calves to be fattened for "baby" beef were distributed in districts where practically the only horned stock reared were dairy heifers. The results were disappointing, as at the sales a great many of the animals were only in a half-fat condition, owing to the lack of knowledge of how such stock should be managed. To make a success of such an endeavour, it would have been necessary to convince members' "elders" that there is no store period in feeding for "baby" beef. A brief review of the stock kept in certain counties will be instructive, and indicative of what experience has shown to be the best type for particular districts.

In Northumberland, where the clubs have a firm hold, the rearing of dairy heifers and beef production are both practised. In this county, particularly in upland districts, where transport facilities are limited and population scattered, the members are chiefly drawn from the small farms lying along the bottom of the Dales. Consequently a comparatively large number of clubs, with a necessarily somewhat limited membership, has been evolved.

Calves, rabbits and poultry were kept at first, but such variety of stock did not prove helpful, and to-day only calves are allotted. The latter are purchased soon after birth and sold at about 12 months old. Calf-rearing is one of the established practices of certain of these upland areas, but with the rapid growth of milk selling, farmers have been compelled to turn to alternative and more economical methods of rearing. It can be truthfully said that the records of the feeding costs of these club calves, together with the improved methods employed, have had a marked effect in raising the general standard of calf-rearing in these districts.

Calf clubs also predominate in Yorkshire. Here the procedure, at least in several clubs, is different. The advisory committee do not purchase the stock, but leave the members to acquire them. At the end of a stated period, the committee visit each farm to earmark, record, weigh and value all calves, and the record book is commenced from that date.

Mainly Shorthorns are kept, but bulls, bullocks, or heifers, the last two either for beef or stores, can be reared at the member's discretion. All stock is brought to the club

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show, and this is followed by an optional sale. If not offered, the show judges—for the purpose of calculating a profit or loss—value the animal.

The following figures, in a season of poor prices, speak for themselves. At a show and sale of one Yorkshire club in May of last year, 14 “baby” beef animals, at an average age of 13 months 17 days, averaged £16 5s. 6d., the mean weight being just over 13½ cwt.; 13 of them made a profit, and one a loss, the average profit being £3 3s. 6d. per head. Sixteen other animals were shown as stores and sold for £11 18s. 0d. per head, 11 showing a profit and 5 a loss, the average profit over the 16 being 12s. each.

In Kent, many clubs are run in conjunction with schools. For this purpose poultry, rabbits and garden plots are most favoured, and excellent work is being done along these lines. The successful development of this form of club is instructive, and the experience thus gained is of value in assisting the formation of similar clubs in other counties. A feature to be noted here—although it applies to some extent to all clubs—is that although a member may, through force of circumstances, have only a limited period of such vocational training, and may leave the countryside for the town, he or she will exert a beneficial influence in helping the urban population to understand the problems and difficulties of those gaining their livelihood on the land. A sympathetic attitude on the part of the townsman towards the countryside is growing, and is well worth fostering.

In Bucks, the aim of those organizing the movement has been principally directed towards an improvement in the type of Dairy Shorthorn kept, this being the almost general breed, particularly in the north of the county where most of the clubs are established. For this reason, great care is exercised in the purchase of the calves, and members are encouraged to retain their stock from year to year as the nucleus of an improved herd.

Owing to the increasing popularity of the Guernsey in West Sussex and the surrounding districts, the two largest clubs in this area rear Guernsey heifers, pedigree imported calves being distributed by one, and calves of a good commercial type by the other. A few figures from one of these clubs gives some idea of the scope of the work and appear to justify the Committee's decision to allot pedigree stock even at greater initial expense. Since 1930, 83 of these calves have been handed over to the boy and girl members.

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Although the clubs themselves contribute to the upkeep of Headquarters, this amount must be quite inadequate for some time to come; and, at present, the staff is very largely maintained by financial grants from the Ministry of Agriculture and Fisheries and the Carnegie United Kingdom Trust. Sanction has now been obtained for the continuation of these grants during the next two years, but such approval has only been obtained on the distinct understanding that the Federation will aim steadily at making the organization self-supporting at as early a date as possible. A Reserve Fund is therefore clearly necessary, and, in furtherance of this, an Appeal has been launched. Although a great many clubs have given financial support to this appeal, assistance from these sources is limited, and it will be necessary to enlist the support of all those interested in the movement.

Some idea of the nature of the work being done has been given in these pages. It is hoped that the response to this appeal will be commensurate with the object which it is intended to assist.

Acknowledgments.—Thanks are due to Major M. Hiles, Secretary of the National Federation of Young Farmers' Clubs, for certain data respecting the geographical distribution of Clubs, to Mr. A. R. Wannop, of Northumberland, and to Mr. W. S. Gibson, of Yorkshire, for notes relating to activities in their particular counties.

CONTROL OF STRAWBERRY PESTS BY HOT-WATER TREATMENT OF RUNNERS

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THE production of consistently good crops of strawberries has for a number of years become increasingly difficult. In every strawberry-growing district in the country, there has been a tendency for the yield per acre to diminish, while there is a very marked reduction in length of the profitable life of plantations. Since 1922, at least, investigations into the cause of this unproductivity have been in progress at more than one centre, and it has become increasingly clear that many factors must be taken into consideration before a final solution of the problem is reached. It is, however, certain that the combined attack of a number of pests has a very material bearing upon the problem, and that their control must be effected before further advance is possible. In other words, the normal incidence of pests is so high that it masks almost entirely the results obtained in investigations into manurial problems, the value of systematic strain selection, and the like.

It is proposed to outline briefly the results of recent investigations into the control of certain strawberry pests by the hot-water treatment, and, wherever possible, to indicate how such results may be turned to practical advantage. In the main the work has been carried out at Reading and at Botley, Hants, and has been aided by a Special Research Grant from the Ministry of Agriculture: where desirable, work at other centres will be mentioned. It is not claimed that final conclusions have been reached, for much of the work is only in its initial stages. Certain results of practical value, however, have already been obtained, and the present plight of many to whom strawberry growing is a means of livelihood suggests the desirability of publishing these results without delay. The process known as Hot-Water Treatment of Runners has already been given some publicity, and there is a very real danger that an erroneous view as to its possibilities and value may arise.

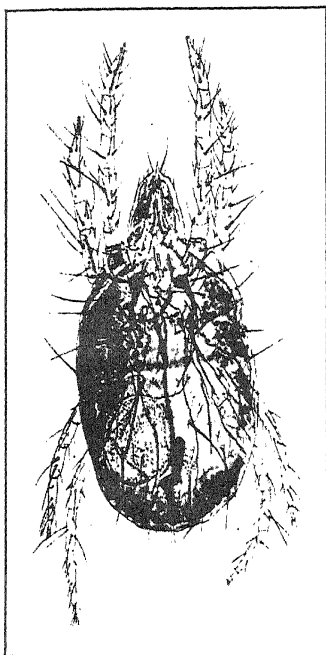
The Object of Hot-Water Treatment. —The primary object of the treatment is to effect the control of certain of

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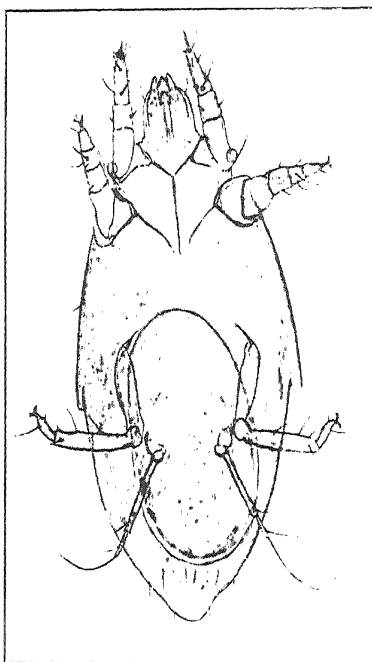
the major strawberry pests. That it does this is definitely established, and there is some evidence that, ultimately, it has a beneficial effect actually upon the plants themselves, apart from the question of pest control. Unfortunately an impression has arisen in some quarters that the treatment is claimed to solve all strawberry-growing problems. That this is so has never been suggested—in effect the treatment is advanced as being a *method by which plantations, substantially free from a number of major pests, may be established*. How these are to be maintained in good health throughout their useful life is an entirely different problem, but quite clearly a clean start is of considerable value. As every grower knows, if a strawberry plantation does not look well in its first year it never will.

Brief reference must first be made to the pests, four in number, that the treatment controls. The first is the Strawberry Mite (*Tarsonemus fragariae*). This pest was discovered in England by Massee⁵ in 1929, and since that time has proved to be of such widespread occurrence as to rank probably first in importance among strawberry pests. More recently Massee⁶ has shown that another mite, the common Red Spider (*Tetranychus telarius*), is also of by no means negligible account, at least in southern England. As long ago as 1927 Briton-Jones and Staniland² found that the Strawberry Aphis (*Capitophorus fragariae*), was responsible for serious injury. Finally, the Strawberry Eelworm (*Aphelenchoides fragariae*), appears to be closely associated with Red Plant and Cauliflower Disease,¹ and, according to Brooks³ is responsible in Florida for a widespread and destructive complaint known as Crimp.

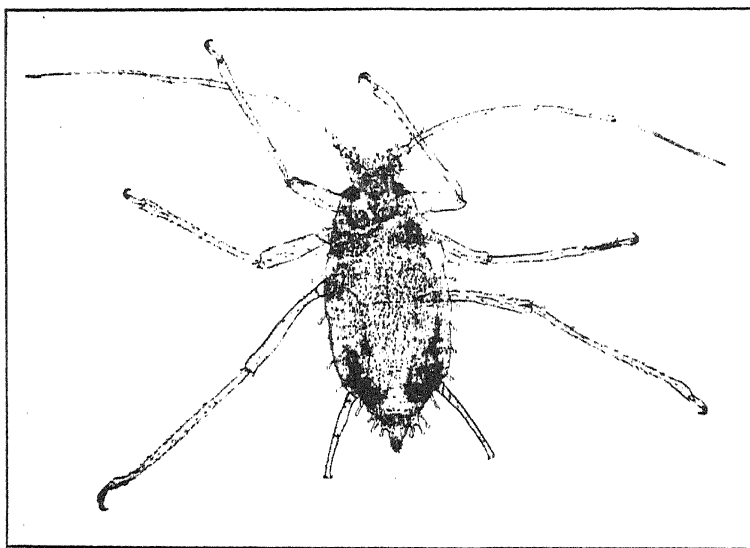
These pests, with the possible exception of the last, about which knowledge is still singularly incomplete, are individually and collectively responsible for very serious damage in strawberry plantations. One or more of them may quite possibly be responsible for the spreading of "virus" diseases described by Plakidas⁷ and Harris.⁴ One point they all have in common. They are difficult, if not impossible, to destroy by orthodox means. Thus, the Aphis, the life history of which is still a mystery, appears to descend upon plantations almost in a night. It can be reduced temporarily by spraying or dusting, but increases again rapidly unless frequent spraying is done. A small residue of Aphides is always present on the runners from such plants, and only the destruction of these by the hot-



Red Spider (*Tetranychus telarius*)
× 100.



Strawberry Tarsonemid Mite (*Tarsonemus fragariae*): adult female × 375.



Strawberry Aphis (*Capitophorus fragariae*) × 40.

Photos: W. E. H. Hodson.

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water treatment is likely to prevent the occurrence later of overwhelming hordes. The Red Spider is never very easy to control under outdoor conditions, and on the strawberry it is singularly difficult to destroy. The low habit of growth of this plant makes it almost impossible to dust or spray beneath the leaves where the mites congregate and breed. Both the Tarsonemid mites and the Eelworms spend the greater parts of their existence entirely concealed between the folded leaflets and in the immediate vicinity of the growing points. Dusting has proved quite useless against them, and so far no spray has been devised that is capable of penetrating to their places of concealment. Finally, all these pests become established upon runner plants long before these are sufficiently mature for removal from the parent plants. In many instances the migration is effected from parent to runner via the stolon whilst the young plant is still only a small bud. In this way young plants are substantially infected at an early date and the pests are distributed to new plantations.

Preliminary Experiments with Hot Water.—In the autumn of 1930, having the above facts in mind, it occurred to the writer that it might prove possible to eradicate all the above pests at one and the same time by immersing the plants in hot water.* The earliest experiments with hot water were conducted at Seale Hayne College with the assistance of Mr. A. Beaumont in September and October, 1930. Runners, heavily infested with Tarsonemid mites and other pests were immersed in water at temperatures ranging from 90° F. to 112° F. for periods varying from 5 to 30 minutes. The treatments were carried out in a small thermostatically-controlled bulb bath and the runners were planted for observation after treatment. Periodical examinations were then made for the presence of living pests upon the plants, and careful notes were made as to the effect of the treatment upon the plants themselves. It is unnecessary to recount these experiments in further detail. In the main it was apparent that temperatures below 108° F. did not effect a sufficiently complete kill of mites, unless the application was unduly prolonged, and that temperatures

* It may be mentioned that Staniland⁸ has advocated dipping of runners in a nicotine solution, before planting out, for the control of Aphis. In 1930 the writer attempted to control the Tarsonemid mite by immersion of plants in solutions of lime-sulphur and in white oil emulsions. In no case was a reasonable measure of control of this particular pest obtained.

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greater than 110° F. were apt to injure the plants. It was ascertained, when treating small numbers of plants under laboratory conditions, on the one hand that 10-minute immersion at 110° F. effected a 100-per cent. kill of mite, aphid, etc., and on the other that immersion at that temperature for not more than 30 minutes had little or no deleterious effects upon the plants.

Experiments in 1931 and 1932.—Early in 1931 the writer transferred to Reading, and since that date the work has continued at Reading University and on the Hampshire County Council Experimental Station at Botley. At the outset it was decided that, for practical purposes, it would be well to extend the time of treatment to not less than 20 minutes' immersion. Therefore no treatments of less than 20 minutes were made subsequently, although many extended to 30 minutes. In both 1931 and 1932, at frequent intervals, batches of plants were treated, and were planted up for observation. In this way it was possible to accumulate data as to the optimum dates at which to carry out treatment, and as to the effect produced upon all those varieties of strawberry commonly grown on a commercial scale in Hampshire.

The information accumulated as a result of these series of experiments was briefly as follows. A complete kill of Tarsonemid mites, aphides and red spiders was invariably obtained. This possibly applies also to eelworms, but further work is required here before a definite pronouncement can be made. In some instances the treatment caused a temporary set back to the plants. This occurred particularly in plants treated at certain seasons of the year, or planted out under unsuitable conditions, and was most marked with treatments of 30 minutes. As a treatment of 20 minutes allows an ample margin of safety as regards pest control the majority of the later treatments were reduced to this time. The check to the plants sometimes proved serious when planting at obviously inopportune times, notably in mid-winter and in dry summer weather. Treating and planting at more normal seasons never produced more than a very transitory check, more apparent than real, and consisting principally of the loss of the outer leaves. Treated plants actually appear to be invigorated, as they eventually surpass in growth the untreated check plants. About 5,000 plants were treated before the autumn

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of 1932, and in no instance, except with mid-winter and mid-summer treatment, were the plants lost.

As a result of experience gained in the experiments described above, it was decided in the autumn of 1932 to attempt treatment on a larger scale. The loan of a 10-cwt.-capacity bulb-treating bath was arranged, and early in November 2,000 runners were treated in this in one operation. The runners were purchased from various sources, and for convenience of handling and to ensure the rapid penetration of the heat, were confined in brussels sprout nets. Some 250 runners were placed loosely in each net and the nets were then dropped bodily into the tank and held beneath the surface of the water with wooden battens. The temperature of the water, before the bags were immersed, was 112° F. and, as anticipated, this fell to 110° F. almost immediately. Unfortunately a steam leak that had escaped notice caused the temperature to rise unduly, and 8 minutes after immersing the plants it stood at 116° F. A hose pipe was procured and the temperature was brought back to 110° F., and thence onwards it remained constantly at this until the conclusion of the 20-minute treatment.

On removal from the bath the nets were at once doused with water from the hose until thoroughly cooled; the runners were removed and spread out, and planted on the following day. An equal number of untreated, but otherwise identical plants, were at the same time planted in an adjacent bed to serve as a control. After 12 months' observation it can be stated that the treated plants have surpassed the controls in every way. They have remained singularly free from pests in spite of the immediate proximity of the untreated and infested plants. They have shown a more robust and regular growth, and quite unexpectedly have provided nearly twice as many vigorous runners as the control plants.

During the winter of 1932 it was thought desirable to explore the possibility of treating plants and afterwards despatching them by rail or post before planting. For this purpose runners in batches of 100 were treated at fortnightly intervals in Reading. They were afterwards dried off and then posted or railed to Botley and planted out. Without exception these treatments were entirely successful. No plants were lost, and throughout 1933 they have remained uniformly robust and healthy. A further point of interest attaches to these experiments in that the plants were all

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purchased through ordinary trade channels from widely different localities, and yet have produced an exceedingly uniform plantation.

Treatments in 1933.—The treating programme in 1933 was very materially aided by the installation of a capacious thermostatically-controlled treating bath at the Botley Experimental Station. Small-scale experiments were temporarily abandoned as it had become essential to lay down large blocks of treated plants. These large blocks are primarily for the purpose of procuring information as to the rapidity with which pests are likely to become re-established under plantation conditions. This information, however, cannot be available for at least another twelve months. Many thousands of plants were treated during the year for future study, and it was found possible to treat limited quantities of runners for local growers at a nominal charge.

The sending away of plants after treatment proved so satisfactory in the autumn of 1932 that it was decided early in 1933 to distribute small lots of plants, similarly treated, to growers in various districts. It is too early to judge the success or otherwise of this procedure, but numerous encouraging reports as to the progress of the plants have been received.

In addition to these main lines of inquiry, information is being obtained on the effects produced by hot water treating runners that are the progeny of previously treated plants. Here again it is as yet too soon to form any definite views, but certainly there is no deleterious effect upon the runners themselves.

It is possible to state that plants treated in 1931 and 1932, and isolated from other strawberries, have remained remarkably vigorous and entirely free from the pests we set out to control.

Discussion.—The above account outlines briefly the principal experimental work which has been carried out on the hot-water treatment of strawberries. In 1932, experiments on somewhat similar lines were laid down at East Malling Research Station; these also appear to have yielded distinctly promising results. In addition a limited number of commercial growers, particularly in Kent, have treated appreciable acreages of plants, extending in some cases to blocks 10 acres in extent, again, as far as can be judged, with obvious benefit. Further, it is of interest to record

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that since the initiation of this work certain growers with wide experience of strawberry growing have stated that they have practised the hot-water treatment of runners for many years.*

It is not for one moment suggested that this treatment is foolproof. Cases have occurred in which a serious loss of plants has occurred, and it must be fully realized that lack of attention to detail is likely to cause disappointment or even disaster. Whenever loss of plants has occurred efforts have been made to discover the cause, generally with success. In more than one instance the thermometer has proved inaccurate, in others plants have heated in bulk between the time of treating and planting. The use of weak, badly-rooted runners, and treating and planting when weather or soil conditions are unfavourable have also caused losses. The above factors, with the sole exception of weather, are entirely within the control of the grower, and neglect to consider each and every one of them deserves the punishment it may bring.

The fact remains that the results so far obtained are of such promise that the writer can without hesitation advise growers to give hot-water treatment a fair trial. This article may be concluded with a brief description of the method by which best results may be obtained. As already indicated treatments must be made with care. It is advised that a grower who is using the method for the first time should limit his treatment to a few thousand plants, so that he may obtain a working knowledge of the required technique before dealing with large plantations.

Time and Temperature.—The total time of immersion of the plants should be 20 minutes, no more, no less, and the temperature of the bath should be maintained at 110° F. throughout. In practice it is found that if the water is heated up to 112° F. or 113° F., according to the bulk of water compared to the bulk of the plants to be treated, the temperature will drop to 110° F. when the plants are immersed. Again, it is stressed that accuracy is essential in the matter of temperature and a *wholly reliable thermometer*, guaranteed to be accurate within one degree, should be used.

The Treating Bath.—Best results are most easily obtained if a special bath is employed, having thermostatic tempera-

* The writer has no information as to the temperature and length of immersion employed in these instances.

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ture control. It is realized that such a bath is by no means always readily available at present, and with a little more care equally good results are obtainable in any of the bulb-sterilizing baths, regardless of the means of heating employed. For example, a bulb bath of 10-cwt. capacity, heated by means of a steam coil, is easily maintained within half a degree of the desired temperature, and will accommodate at least 5,000 runners at one time. With sufficient care, improvised apparatus may be employed, for if a sufficient bulk of water be used it is not very difficult to maintain it at the required temperature. In such case it is advisable always to have at hand adequate supplies of both hot and cold water with which temperature adjustments may be made as required. Whatever container be used, it is important that the water be stirred frequently in order to maintain its temperature uniform throughout the tank.

The Plants.—Runners must be placed loosely in the water, for if packed in or tied in bundles penetration of the heat will be uneven and too slow. It will be found convenient to place the runners first in loosely woven bags or nets, brussels sprout nets are admirable for the purpose, and each will accommodate some 200-250 runners. The bags can then be dropped into the bath, again not packing tightly, and held beneath the surface of the water by means of wooden battens. If a considerable quantity of earth is adhering to the roots, as when the plants are lifted wet or are grown in a sticky soil, it is advisable to remove some of the soil by rinsing in cold water before treating. Immediately on removal from the treating bath the plants must be cooled down, either by dipping in cold water or by dousing from a hose pipe. Wet plants in bags very soon "heat" and unless planting takes place within a very few hours of treating it is essential that they be removed from the bags and spread out to dry. If plants are to be sent by post or rail, the drying off of surface water must be complete before they are bundled and packed.

It is never wise to plant poor runners, and hot water treatment is not advised if runners are weak or poorly rooted, or if they have been heeled in for a lengthy period. Such runners may suffer too severe a check if treated.

The Time to Treat.—Extensive observation of runners treated at all seasons of the year suggests that early autumn and mid-spring are the optimum seasons at which to treat. If treatment is delayed until late autumn and carried out in

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mid-winter or at times when there is serious danger of drought subsequently, less satisfactory results are sometimes experienced. In other words, bearing in mind the habits of the strawberry, it is best to treat and plant at a time when active growth is to be expected. If the plants stand still for weeks after treatment, then subsequent recovery is somewhat retarded owing to the delay in making good the loss of leaf that sometimes follows treatment. It is better to delay treating and planting until soil and weather conditions are favourable than to proceed at an unsuitable time.

If hot-water treatment of strawberries is carried out without due care only good fortune will prevent the loss of at least some of the plants. If, on the other hand, treatment is given on the lines suggested above, the grower is definitely assured of starting with plants free from at least three of the most serious pests from which strawberries suffer.

In conclusion acknowledgment must be made to Mr. C. J. Gleed, Horticultural Superintendent, Hampshire. Mr. Gleed has personally supervised all the work carried out at Botley, and only his wholehearted co-operation has enabled the field trials to be carried out satisfactorily. It must also be recorded that Miss M. Shaw, Reading University, has carried out much of the actual treating work, and has assisted in the compilation of the very comprehensive series of field notes required.

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MARKETING NOTES

Potato Marketing Scheme.—The result of the initial poll, declared on Feb. 5, was overwhelmingly in favour of the scheme remaining in force. Of the registered producers voting, 90.44 per cent., representing 90.6 per cent. of the total potato acreage of those who voted, were in favour of the scheme. The marketing provisions and the principal powers of the Board will accordingly come into operation at the expiration of the suspensory period, that is to say on March 8. After this date, a producer who is neither registered nor exempt from registration will not be allowed to sell any potatoes either in Great Britain or elsewhere. Only producers who grow less than one acre of potatoes are exempted from registration and it is important, therefore, that all producers who grow one acre or more should register at once with the Board, if they have not already done so. Applications for registration should be addressed to the Secretary, Potato Marketing Board, Thames House, Millbank, London, S.W.1.

Captain John Mollett, of Knaresborough, Yorkshire, has been elected chairman of the Potato Marketing Board, and Mr. Alexander Batchelor, of Dundee, vice-chairman. Mr. E. C. Boughton has been appointed secretary and chief executive officer.

The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have appointed Mr. W. Gavin, C.B.E., and Captain the Hon. James Gray Stuart, M.V.O., M.C., M.P., to be their nominees on the Board.

To provide expenses incurred in connexion with the initial poll, the Minister and the Secretary of State have sanctioned a loan to the Board of £3,300 from the Agricultural Marketing Funds.

Milk Marketing Scheme.—The terms and conditions of the milk contract for the period April 1 to Sept. 30 next have been discussed between the Milk Marketing Board and representatives of distributors and manufacturers, but no agreement was reached. The question of price has, therefore, been referred to the "appointed persons," in accordance with paragraph 60 of the Scheme.

The regional pool prices and rates of producer-retailers'

MARKETING NOTES

contributions for the four months of the contract period Oct.-Jan., 1933-34, are given below:—

Region.	Regional Pool Price.				Producer-Retailers' Contribution.			
	Oct. 1933	Nov. 1933	Dec. 1933	Jan. 1934	Oct. 1933	Nov. 1933	Dec. 1933	Jan. 1934
	(Pence per gallon)				(Pence per gallon)			
Northern	13 $\frac{3}{4}$	14	14 $\frac{1}{2}$	14	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$
North-western	13 $\frac{3}{4}$	14	14	13 $\frac{3}{4}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{5}{8}$
Eastern	14	14 $\frac{1}{4}$	14 $\frac{3}{4}$	14 $\frac{1}{2}$	1	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{3}{8}$
East Midland	13 $\frac{1}{2}$	14 $\frac{1}{4}$	14 $\frac{1}{2}$	14	1 $\frac{3}{8}$	1 $\frac{9}{16}$	1 $\frac{9}{16}$	1 $\frac{3}{8}$
West Midland	12 $\frac{3}{4}$	13 $\frac{3}{8}$	14	13 $\frac{1}{4}$	1 $\frac{1}{8}$	2 $\frac{1}{8}$	1 $\frac{3}{8}$	2 $\frac{1}{8}$
North Wales	13 $\frac{1}{2}$	13 $\frac{3}{8}$	14	13 $\frac{3}{8}$	1 $\frac{9}{16}$	1 $\frac{9}{16}$	1 $\frac{3}{8}$	1 $\frac{5}{8}$
South Wales	13 $\frac{3}{8}$	13 $\frac{3}{8}$	14	13 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{5}{8}$	1 $\frac{3}{8}$	1 $\frac{5}{8}$
Southern	14	14 $\frac{1}{4}$	14 $\frac{3}{4}$	14 $\frac{1}{2}$	1	1 $\frac{9}{16}$	1 $\frac{9}{16}$	1 $\frac{3}{8}$
Mid-western	12 $\frac{3}{4}$	13 $\frac{3}{8}$	14 $\frac{1}{4}$	13 $\frac{3}{4}$	1 $\frac{5}{8}$	1 $\frac{5}{8}$	1 $\frac{9}{16}$	1 $\frac{5}{8}$
Far-western	13 $\frac{1}{2}$	13 $\frac{3}{8}$	13 $\frac{3}{4}$	13 $\frac{1}{2}$	1 $\frac{9}{16}$	2 $\frac{1}{8}$	1 $\frac{1}{8}$	2 $\frac{1}{8}$
South-eastern	14 $\frac{1}{4}$	14 $\frac{1}{2}$	15 $\frac{1}{4}$	15 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{9}{16}$	1 $\frac{9}{16}$
Unweighted Average	13.55	13.95	14.32	13.98	1.41	1.78	1.58	1.84

Contract prices for milk in January were the same as in the previous month, viz., 1s. 4d. per gallon in all regions except the South-eastern, where the price was 1s. 5d. per gallon.

Producer-retailers who have qualified will receive credit for the level delivery premium of 1d. per gallon as a deduction from their contributions. The inter-regional compensation levy was again fixed at 1d. per gallon on all liquid milk sales, and 85 per cent. of the proceeds therefrom were distributed among the regions in proportion to their sales of manufacturing milk. The levy for the Board's expenses, including the provision of reserves, was again at the rate of $\frac{1}{4}$ d. per gallon on all sales of contract milk.

Of the total milk sold on liquid and manufacturing contracts in January, approximately 21 per cent. passed into manufacture, compared with 18 per cent. in December. The Board have announced that the price for manufacturing milk made into butter or cheese, and also condensed milk for export will be 3 $\frac{1}{4}$ d. per gallon during February, a decline of $\frac{1}{4}$ d. per gallon on the price for the previous month.

The Board have announced the appointment of Regional Marketing Officers. Among their duties will be the investigation of instances in which producers are evading the provisions of the scheme, either by selling on contracts not approved by the Board or, in the case of producer-retailers, by selling without a retail licence.

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Pigs and Bacon Marketing Schemes.—*Operation of the Contract System.*—The difficulty occasioned by the low prices of bacon, which was experienced in the early working of the contract system for bacon pigs, has now been removed by the marked improvement in prices that has taken place since mid-December. On the other hand, there are indications that the present temporary attractiveness of the pork pig market is leading to evasion of contracts by farmers in some instances. The Pigs Marketing Board has, in consequence, warned producers through the Press of their liability, for deliberate default, for damages of £1 for every pig not delivered according to contract.

Results of Pig Grading.—The following Table shows the final results of the grading of bacon pigs under contract during November and December:—

					November. Per cent.	December. Per cent.
Grade A	..	..	..	..	4.9	5.2
" B	..	..	..	..	20.1	22.7
" C	..	..	..	..	18.8	20.0
" D	..	..	..	..	33.2	31.4
" E	..	..	..	..	3.2	2.5
<i>Other Pigs—</i>						
Class 4 pigs (ungraded)*	..	..	..	..	4.5	4.2
Ungraded, but accepted by curers	..	..	..	..	7.8	8.4
Rejected	..	..	..	..	7.5	5.6

* No Class 4 pigs are graded and, in addition, a number of pigs of poor quality or of wrong weights have been accepted by curers.

The percentage of all pigs delivered which fell in the two lowest grades was 33.9 in December compared with 36.4 in November, while the percentage of all pigs in the three top grades rose from 43.8 in November to 47.9 in December.

Transport Arrangements.—An agreement has been reached between the Pigs and Bacon Marketing Boards and the railways companies for a flat rate, commencing on March 1, for the transport of live pigs to bacon factories. The flat rate agreed is 2s. per pig minus the railway freight rebate of 4d., i.e., 1s. 8d. net, and is subject to the condition that for journeys of over 5 miles all pigs are to be conveyed by the railway companies by road or rail. A small standing Committee of representatives of the Boards and the railway companies will consider cases where, owing to exceptional circumstances, freedom of action as regards transport is claimed by feeders or curers in respect of pigs, for distances of over 5 and up to 15 miles.

Where reasonably required to do so, the companies agree to carry the pigs by road from feeder to curer for distances up to 15 miles, subject to a minimum load of 15 pigs.

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Compensation to Curers.—The Minister of Agriculture and Fisheries announced in the House of Commons on January 31 that it had been agreed between the two Boards, with the cognizance of the Government, that registered curers shall be compensated in respect of losses incurred on pigs bought from registered pig producers at the prescribed prices, and on which the Pigs Board levy was paid, during the period September 15 to December 31, 1933, and that no account should be taken of profits or losses on pigs bought subsequently. To enable this compensation to be paid, a loan will be made to the Bacon Marketing Board out of the Agricultural Marketing Funds; this loan will be repaid out of moneys obtained by a special deduction from payments for pigs in ensuing contract periods. It is anticipated that the loan will be in the neighbourhood of £160,000.

New Contract Terms.—(a) *Prices.*—After prolonged negotiations regarding the contract prices for pigs for the period commencing March 1, the Pigs and Bacon Boards brought into consultation the Wyndham Portal Committee which had been set up to supervise the making of payments out of the Government loan to the Bacon Marketing Board. The following terms have now been settled:—

During the first two months of the period—March and April—the price per score of the basic pig will be 12s. 6d. as long as the price of the agreed ration remains at 7s. 6d. per cwt. This is an advance of 6d. per score on the present price, but there is to be a deduction by the curer of 6d. per score towards repayment of the Government loan, so that the net price to the farmer remains the same—12s. per score.

A new method of price-fixing comes into operation on May 1, the aim being to relate pig prices not only to feed prices but also to the prices realized by the bacon and offals obtained from the pig.

The Boards have agreed upon "initial prices" for pigs and bacon, viz., 11s. per score for the pig and 85s. per cwt. for the bacon. These prices are not intended to represent cost of production. They merely serve to define what the Boards regard as a due relation between pig and bacon prices. When the price of bacon is 85s., provided other factors do not vary, the price of pigs should, in the opinion of the Boards, be 11s. per score.

For every 3d. per cwt. variation in the price of the agreed ration of feeding stuffs above or below 7s. 6d., a corresponding variation of 3d. per score is to be made in the initial price of the pig and of 1s. 9d. per cwt. in the initial price of the bacon—on the broad principle that 7 score of pig equal 1 cwt. of bacon. Thus, with feed at 7s. 9d., the initial pig price is 11s. 3d. per score and the initial bacon price 86s. 9d. per cwt.

The initial bacon price, again, is based on the assumption that the offals from a 7-score pig realize 10s. If they realize less or more, a corresponding addition or deduction is to be made to or from the initial bacon price. Thus, if offals realize only 9s., the initial bacon price of 85s. would be raised to 86s. per cwt.

A further principle is the sharing between producer and curer of any "profit" or "loss," represented by the difference between the

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initial price of bacon and the actual realized price. For every 1s. 2d. variation in the ascertained price of English bacon, above or below the initial price of 85s.—as modified if necessary to allow for changes in feed prices or offal values—there is to be a corresponding variation in the pig price of 1d. per score above or below the initial price of 11s. The farmer thus receives one-half the profit or bears one-half the loss on the actual price of the bacon as compared with the initial price of 85s. In the months of September to December, the producer will, however, receive 75 per cent. instead of 50 per cent. of the surplus in respect of any excess over 13s. per cwt. in the margin between the actual and initial price of bacon. Expressed in terms, this means that with an initial price of 85s., whenever the bacon price is over 98s. the producer will get an extra 1½d. per score instead of an extra 1d. for every 1s. 2d. per cwt. by which the price of bacon exceeds 98s.

The bacon price that is to be taken as the basis for pig prices is that of sizeable green Wiltshire whole sides delivered to retailer, and is to be arrived at each month by averaging certified returns obtained from five Wiltshire factories, which are to be agreed between the two Boards. The value of offals is to be ascertained in the same way.

(b) *Other Terms.*—Apart from price conditions, the remainder of the contract terms do not differ markedly from those of the previous contract.

There are, however, two forms of contract—a general contract and a Wiltshire contract respectively. The latter is framed to meet the special needs of Wiltshire curers and provides for the delivery of Class I pigs only, i.e., pigs within the weight range of 7 score to 8 score 10 lb. dead weight.

The new contracts provide for the transport of all pigs in accordance with the agreement that has been reached with the railway companies.

Slight amendments have been made in the grade measurements, tending to make grading a little more strict, and the deductions in respect of pigs below Grade C have been increased to 6d. per score for each grade instead of 3d. as before. On the other hand, the deductions in respect of Class III and IV pigs as compared with Class I pigs are only 9d. and 1s. 3d. per score respectively instead of 1s. and 1s. 6d. per score.

First Annual Meetings of the Boards.—The three “special members,” elected by the registered producers at the first annual general meeting under the Pigs Marketing Scheme, on February 16, were the Earl of Radnor, Major C. M. Higgins, C.B.E., M.C., and Mr. E. W. Langford, J.P., C.A. The new Board, consisting of eight “district members” and the three “special members,” will come into office on April 1, 1934.

The following remuneration of members of the Board in respect of the period July 7, 1933, to March 31, 1934, was agreed to:—Chairman, £600; Vice-Chairman, £400; other members of the Executive Committee, £270; remaining members of the Board, £220.

The first annual general meeting of registered bacon curers was held on February 14. A total remuneration of £2,100 was voted to Board members in respect of service up to March 31, 1934, and the total remuneration for a full year was fixed at £2,800. After March 31, 1934, the present Board will be succeeded by a Board of 14 members elected by the registered curers in the preceding month (February). The electors voted in three separate categories according to their aggregate output of bacon during the preceding calendar year, with a further separate category for Scottish curers.

Registration of Contracts.—Owing to the protracted negotiations for the settlement of the terms of the new contracts, there has not been sufficient time to give producers a full explanation of the new form of contract. It has, accordingly, been decided to extend, until

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March 12, the period during which contracts will be accepted for registration by the Pigs Marketing Board. Contracts received by the Board after that date will not be valid. This means that the last date by which producers should apply to curers for contract forms is March 7. Producers are reminded that if they do not make contracts now, they will not have another opportunity before 1935.

Regulation of Imports of Bacon.—In the January issue of the JOURNAL (p. 960), reference was made to the Government's decision to reduce imports of bacon from foreign countries by a further 7 per cent. on March 1 and by an additional 3 per cent. on June 1, provided that these steps were justified by the number of pig contracts entered into by home producers for the period March 1 to December 31 next, due allowance being made for Northern Ireland production. Following the protracted negotiations regarding the contract terms for the delivery of bacon-pigs in this period, it became clear that the volume of home contracts would not be known in time to give foreign exporting countries reasonable notice of the actual foreign allocation to operate from March 1. In the circumstances, it was decided that total imports of bacon from foreign countries should continue during the four weeks beginning March 1 at the average four-weekly rate in operation during the quota period ended on February 28. This arrangement was made on the understanding that the revised foreign allocation, determined in the light of the volume of home contracts when known, would be regarded as operating as from March 1, and that subsequent adjustments would be made in the event of imports in the first four weeks of the period exceeding or falling short of the new quota rate.

Committee of Investigation for England.—The Committee met on January 3, 15 and 16 to consider a complaint made by the Brewers' Society against the operation of the Hops Marketing Scheme, 1932, and reported to the Minister on January 19 that the evidence and arguments before them disclosed no justification for the complaint. The Hops Marketing Board and the Brewers' Society have been informed accordingly.

Committee of Investigation for Great Britain.—The Committee met on January 16 and 29 to consider complaints by the Parliamentary Committee of the Co-operative Congress and the Livestock Officers' Association against the operation of the Pigs Marketing Scheme, 1933. At the meeting on January 29 the Parliamentary Committee was represented by their Secretary, the Rt. Hon. A. V. Alexander; the Livestock Officers' Association by Mr. F. R.

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Evershed, K.C., and Mr. Alfred Tylor; and the Pigs Marketing Board by Mr. L. C. Graham Dixon.

The Committee have now reported to the Ministers on the complaints. Their findings are that the complaints were justified and that compulsory insurance with an individual company to the exclusion of all other companies was neither necessary nor essential, and was unfair to the other companies and to the insured, and contrary to the public interest. The Committee were satisfied that the companies represented before them were both able and willing to afford all the advantages (including administrative advantages) afforded by insurance with one individual company.

The Pigs Marketing Board have given an assurance that, during the next contract period, commencing March 1, 1934, the business of insuring pigs will not be withheld from any reputable company or society which is prepared to undertake the business on terms which the Board accept from any other company or society.

Consumers' Committee for England.—The Committee have held further meetings to consider the question of retail milk prices, and have submitted a report thereon to the Minister.

Production of Home-Grown Beet Sugar.—The total quantity of beet-sugar manufactured during January, 1934, was 1,364,894 cwt. and the total production from the opening of the campaign until the end of January was 9,239,875 cwt. All factories had finished manufacturing by the middle of February. The total production of sugar is estimated at 9,260,000 cwt., a record production of home-grown sugar in this country. The highest previous figure was 8,485,965 cwt. in 1930-31.

The following preliminary figures give an indication of the general results of the campaign:—

Area under beet	366,000 acres.
Weight of beet	3,305,000 tons.
Yield per acre	9 tons.
Sugar content	16.4 per cent.
Estimated production of sugar	9,260,000 cwt.
Estimated production of molasses ..	2,525,000 cwt.

Sugar Marketing Scheme.—A scheme under the Agricultural Marketing Acts, 1931 and 1933, for regulating the marketing of sugar in Great Britain has been submitted to the Minister of Agriculture and Fisheries and the Secretary of State for Scotland.

Copies of the scheme may be obtained, on written application and on payment of one shilling per copy (post free), from Mr. Alfred Wood, F.C.A., Inveresk House, Strand, London, W.C.2, or may be inspected on personal application at the before-mentioned address (except on public holidays) between the hours of 10 a.m. and 5 p.m. on weekdays, and 10 a.m. and 12 noon on Saturdays.

Any objections and representations with respect to the scheme should be addressed to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, the Under-Secretary of State for Scotland, Scottish Office, Whitehall, London, S.W.1, or the Secretary, Department of Agriculture for Scotland, York Buildings, Queen Street, Edinburgh, so as to reach them not later than March 24, 1934; objections received after that date will not be considered. Every objection must be made in writing and must state the grounds of objection and the specific modifications required.

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Wheat Act, 1932: Sales of Home-Grown Wheat.—Cereal Year 1933-34.—Certificates lodged with the Wheat Commission covering wheat sales from the commencement of the cereal year on Aug. 1, 1933, up to and including Feb. 17, 1934, indicated sales of 18,998,865 cwt. of millable wheat.

Second Advance on Account of Deficiency Payments.—On Feb. 17 the Commission made a second advance payment to registered growers in respect of deficiency payments for the current cereal year. The advance was at the same rate as hitherto, namely, 3s. per cwt., and was made in respect of applications received from registered growers on valid wheat certificates delivered to the Commission after Oct. 28 and on or before Jan. 19. The sum so distributed was about £1,200,000, making the total of the advances paid to date in respect of the current cereal year approximately £2,500,000.

Anticipated Supply of Home-grown Millable Wheat, 1933-34.—Under the Wheat Act, 1932, the Minister is required to make an Order at the beginning of each cereal year prescribing the quantity (called the anticipated supply) of home-grown millable wheat of their own growing which he anticipates will be sold by registered growers during that year. In the Anticipated Supply No. 1 Order, 1933, the Minister prescribed the anticipated supply for the cereal year beginning Aug. 1, 1933, as 27 million cwt.

The Act further provides that the anticipated supply may be varied by Order before the end of January in the cereal year to which it relates, and by virtue of this power, the Minister, after consultation with the Wheat Commission, has made the Anticipated Supply No. 1 Order, 1934, raising the anticipated supply from 27 million cwt. to 29 million cwt. This variation is due to an increase in the estimated yield per acre of home-grown wheat of the 1933 harvest.

The maximum quantity of millable wheat in respect of which full deficiency payments may be made is 27 million cwt. The new Order does not therefore have the effect of increasing the total sum which will be received by registered growers as a whole on account of deficiency payments, nor will it increase the amount of quota payments to be made by millers and importers of flour.

The Flour Millers' Corporation may be required, if the Minister so directs, to purchase stocks of millable wheat

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remaining unsold in the hands of growers during the months of June and July in any cereal year, up to a maximum of one-eighth of the anticipated supply for that year. The new Order may affect the quantity of millable wheat which the Minister may require the Corporation to purchase in June or July next, in the event of the Wheat Commission representing to the Minister that it is expedient that this power should be exercised.

National Mark Eggs.—On February 1, 1934, the National Mark Egg Scheme entered upon its sixth year of operation, and the following is a brief review of progress.

The table opposite shows, for each month of the years 1931, 1932 and 1933, the total output of the authorized packing stations, and the quantity of eggs packed under the National Mark.

Of the 356 million eggs packed under the National Mark in 1933, compared with 1932, amounted to 61 millions in cent. were consigned to wholesalers, the remainder passing directly from packer to retailer or consumer. The increase in 1933, as compared with 1932, amounted to 61 millions in total output, and 44 millions in National Mark output; the percentage of output packed under the Mark showed a slight reduction from 81 to 80 per cent.

As in previous years, the expansion of the scheme has been mainly due to increased production of eggs and the greater use of existing packing stations, rather than to an appreciable increase in the number of stations operating which, at the end of 1933, was only four more than at the close of 1932.

The following table gives a broad idea of the expansion in the output of packing stations:—

<i>Output.</i>		<i>No. of Stations.</i>			
		1930.	1931.	1932.	1933.
Over 10 million eggs	..	—	1	4	6
5 to 10 " "	..	3	10	14	32
2 to 5 " "	..	28	36	38	36
Under 2 " "	..	109	93	90	92

With the exception of a very few of the smallest stations, which handle only a few thousand dozen eggs annually, all authorized stations are now equipped with up-to-date grading and testing apparatus. This has in part been made possible by the increased facilities for the supply of electricity in rural areas.

The purchase of supplies by packing stations on a statu-

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Month	1931			1932			1933		
	Total output of Packing Stations (Fresh Eggs)	Output under National Mark	Percentage of total output packed under National Mark	Total output of Packing Stations (Fresh Eggs)	Output under National Mark	Percentage of total output packed under National Mark	Total output of Packing Stations (Fresh Eggs)	Output under National Mark	Percentage of total output packed under National Mark
Jan. ...	Millions 21.5	Millions 16.0	Percentage 74	Millions 27.2	Millions 21.9	Percentage 80	Millions 35.1	Millions 29.1	Percentage 84
Feb. ...	21.9	17.0	78	30.7	25.6	84	35.0	28.9	82
March ...	31.6	24.3	77	45.2	36.3	80	55.7	43.6	78
April ...	34.6	25.0	72	43.5	34.7	80	52.3	39.7	77
May ...	32.4	23.4	72	40.1	32.6	81	50.6	38.9	77
June ...	31.5	23.4	74	38.1	30.3	80	42.0	32.6	78
July ...	26.4	19.8	75	30.9	24.8	80	34.5	27.6	80
August ...	22.1	17.0	77	28.8	23.2	81	31.1	24.7	79
Sept. ...	23.5	18.7	79	27.6	22.7	82	30.4	24.3	80
Oct. ...	21.5	16.4	76	23.8	19.5	82	30.0	25.3	84
Nov. ...	18.9	13.8	70	21.2	18.2	86	23.7	20.4	86
Dec. ...	24.8	19.0	77	27.2	22.7	83	25.0	21.2	80
Total for 12 months	310.7	233.8	75	384.3	312.5	81	445.4	356.3	80

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Bunches will consist of two or more sticks tied together and will weigh 8 oz., double bunches weighing 16 oz. These may be tied together in bundles weighing not less than 7 lb. Non-returnable boxes are specified for packing rhubarb under the National Mark but growers will also be allowed to use approved returnables.

National Mark Canned Fruit and Vegetables.—The Essex Canning Co., Ltd., Eastern Road, Burnham-on-Crouch, Essex, have recently been authorized as National Mark canners. The number of firms now authorized under the scheme is 42, operating 54 factories.

The operation of the scheme during the past season was reviewed at a recent meeting of the National Mark Canned Fruit and Vegetables Committee, and recommendations were made for further improving the quality of canned fruit and vegetables sold under the National Mark. Among these was a recommendation that observance of the tentative standards for size of fruit, weight of fruit in cans and syrup strength, suggested for use by canners in 1933, should be made binding on all National Mark canners in 1934. These standards have been used experimentally by canners during the past season and, subject to a few minor alterations, have been approved by the industry in general as a desirable step in the direction of uniformity of product. The standards will, therefore, become operative as a condition of the scheme during the forthcoming season.

The Committee also considered that the following varieties of peas should be removed from the list of varieties permitted to be packed under the National Mark:—Chemin Long, Gontier Blanc, Gradus, Sharpe's Standard.

The present list of strawberries that may not be canned under the National Mark will be replaced by a list of permitted varieties, details of which are at present under consideration.

National Mark Vegetables.—In continuance of the plan for the introduction in 1934 of standard grades and packs for the whole range of vegetables produced commercially in England and Wales, National Mark schemes have been prepared, for introduction this season, in respect of Watercress, Green Beans, Parsnips, Turnips and Swedes.

Watercress.—This scheme provides for two grades, "Selected" and "Selected Bunched." Watercress of both grades must be of the

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prescribed standard of quality and well trimmed to an over-all length of not less than 5 in. and not more than 6 in. The "Selected Bunched" grade must be tied in neat, orderly bunches of from 5 to 6 in. in circumference at the point of tying. The prescribed container for both grades will be the 12 lb. chip basket, but applications for the use of other forms of containers will be considered by the Trade Committee.

The scheme also provides that the watercress beds shall be so designed as reasonably to prevent contamination or infiltration and to preclude the drainage of water into the beds. The National Mark label to be applied to watercress will contain a statement to the effect that the watercress is grown in beds of approved construction and that periodical tests of the ingoing water supply indicate that it is of drinking water quality.

Authority to apply the National Mark will be granted to individual growers with a minimum area of $\frac{1}{4}$ acre of watercress.

Green Beans.—The proposed grades for green beans packed under the National Mark are "Extra Selected Glasshouse," "Selected Glasshouse" and "Choice" for kidney beans and "Selected" and "Choice" for runner beans. "Extra Selected Glasshouse" kidney beans will be required to be not less than 4 in. in length and to exceed neither $1\frac{1}{8}$ in. in the widest transverse diameter nor $1\frac{3}{4}$ in. in thickness. "Selected Glasshouse" kidney beans must be not less than 4 in. in length, and "Choice" kidney beans not less than $4\frac{1}{2}$ in., whilst "Selected" runner beans and "Choice" runner beans must be not less than 7 in. and 5 in. in length respectively. A degree of straightness of pod for each grade has been specified, whilst the pods in any one container must be reasonably uniform in size.

"Extra Selected Glasshouse" and "Selected Glasshouse" kidney beans must be packed in No. 6 or 12 chip baskets, "Choice" kidney and "Selected" runners in No. 6 or 12 chip baskets or the half-pot crate, and "Choice" runners in half-pot crates or in 20 lb. bags. During the first year of the operation of the scheme, permission may be granted to individual packers to use the standard returnable bushel box for the short-range marketing of beans. The net weight of beans in any container at the time of packing must be declared on the National Mark label.

Authority to apply the Mark, in the first instance, will be confined to (1) growers of at least 1 ton of beans in a year, and (2) approved associations of growers without regard to output.

Parsnips.—Parsnips packed under the National Mark will be marketed under two grades, viz., "Selected Washed" and "Selected Unwashed." Each parsnip must be between $2\frac{1}{4}$ and $3\frac{1}{2}$ in. in widest transverse diameter except in the period August and September, when it must be not less than $1\frac{3}{4}$ in. nor more than $3\frac{1}{2}$ in. Both grades will be packed in standard returnable bushel boxes or in sacks holding not less than 56 lb. net, but consideration will be given to applications for the use of alternative forms of containers.

The size range of parsnips when packed in sacks must be declared on the National Mark label together with the minimum net weight of the parsnips. When packed in returnable bushel boxes, the count in multiples of 6 or 12 or alternatively the minimum net weight of parsnips must be declared. Authority to apply the Mark will be granted to growers with an estimated annual output of not less than 10 tons or with a minimum area of 1 acre devoted to the cultivation of parsnips, to merchant packers packing 50 tons in a year, and to approved associations of growers.

Turnips and Swedes.—The two grades proposed for turnips packed under the scheme are "Selected Washed" and "Selected," whilst one grade only, viz., "Selected," is provided for swedes.

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Turnips of both grades must be between $2\frac{1}{4}$ and $3\frac{3}{4}$ in., and swedes not less than $3\frac{1}{2}$ in. nor more than $5\frac{1}{2}$ in. in transverse diameter.

Turnips will be packed in sacks holding not less than 56 lb. net and swedes in sacks of 56 lb. or 112 lb. net, and the minimum net weight must be declared on the National Mark label. Consideration will be given to applications from authorized packers for permission to use other forms of containers. Authority to apply the Mark will be granted to growers or packers with an estimated output of not less than 20 tons of turnips and/or swedes, or whose area devoted to the cultivation of these roots is not less than 2 acres, and also to merchant packers repacking not less than 50 tons per annum and to approved associations of growers.

Marketing Demonstrations.—By the courtesy of the Royal Horticultural Society, the Ministry will stage, at the Society's Spring Show, to be held in the Old Hall, Vincent Square, London, S.W.1, on April 17-18, a comprehensive demonstration of the National Mark vegetable schemes.

The main object of the Society in holding this Show, the third of its kind, is to call attention to the manner in which home producers are meeting the requirements of the market in the supply of early vegetables and flowers, thereby justifying the imposition of the import duties on such produce. The Ministry's exhibit will aim at showing the standard grades, packs and packages of the whole range of the National Mark Schemes for vegetables. Besides bench exhibits of specimen graded standard packs, a number of practical demonstrations will be given, such as the grading, bunching and packing of spring onions, radishes, turnips, leeks, and broccoli. The mechanical grading of main-crop onions and tomatoes will also be shown.

Publicity for National Mark Products.—The Ministry of Agriculture and Fisheries, in co-operation with the National Federation of Women's Institutes, has arranged for a National Mark Flour cookery competition to be held in conjunction with the South London Exhibition at the Crystal Palace, London. This exhibition, which is to be opened by the Prime Minister, will be held from March 7-17, but the competition exhibits will be displayed from March 15-17.

The competition is being conducted on an inter-County basis, and 26 County Federations of Women's Institutes in England and Wales have entered teams. The exhibits will comprise bread, scones, cakes, biscuits and shortbread made from National Mark flour, including wholemeal. The Ministry will award certificates for the best three entries in

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each section, and also a silver and ebony plaque to the County Federation that scores the highest aggregate number of points.

The Ministry will stage a comprehensive display of National Mark products in the Empire Section of the Exhibition.

Publicity for Home-Grown Bulbs, Plants, Trees, Shrubs and Cut Flowers.—The Minister of Agriculture has appointed a Committee to advise the Ministry upon the measures to be taken:—

- (i) for giving wider publicity to and increasing the demand for home-grown bulbs, plants, trees, shrubs and cut flowers;
- (ii) for standardizing the methods of marketing these commodities;
- (iii) for establishing an organization of the horticultural industry for these purposes.

The composition of the Committee is as follows:—

Sir Lionel Earle, G.C.V.O.,

K.C.B. (Chairman)

Mr. John W. Coe	National Federation of Fruit & Potato Trades' Associations (Inc.), Ltd.
Mr. F. S. Harvey Cant ..	Association of British Rose Producers.
Mr. George Monro, C.B.E. ..	Royal Horticultural Society.
Mr. Owen Murrell	British Rose Growers' Association.
Mr. George Shawyer	British Flower Marketing Association.
Mr. O. C. A. Slocock	Horticultural Trades' Association.
Mr. A. W. White	Spalding and District Bulb Growers' Association.

A nominee of the National Farmers' Union will also be appointed.

Mr. A. W. Knee, of the Ministry, will act as Secretary of the Committee, and Mr. C. H. B. Kenyon, who was formerly engaged on similar publicity work under the Empire Marketing Board, will continue his activities under the Ministry's direction.

A further note on this Committee and its work appears at p. 1203.

Irish Free State: Report of Pig Industries Tribunal.—The Pig Industries Tribunal appointed by the Governor-General of the Irish Free State to inquire into, and make recommendations to the Minister for Agriculture upon various matters connected with the pig and bacon industries has issued its final report.

An interim report concerning the measures necessary for the control of exports of bacon and live pigs, in view of the

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steps taken to regulate the imports of these commodities into the United Kingdom has already been reviewed in this JOURNAL. (Vol. XL, 1933, No. 6, Sept., p. 551.)

The most important recommendations of the Final Report include:—

(1) The establishment of a Pigs Marketing Board, representative of pig producers and bacon curers, with statutory powers to prescribe and enforce standard classes and grades for all pigs killed in licensed bacon factories and to determine, inter alia, the prices to be paid for pigs by bacon curers.

For the purpose of determining pig prices, the Board is to be empowered to demand from curers particulars of bacon manufacturing costs and of the quantities of pigs handled and of bacon sold.

(2) The establishment of a Bacon Marketing Board, representative of registered curers, with powers to regulate quantitatively the slaughtering of bacon pigs and the sales of bacon and hams on the home and export markets.

In determining the number of pigs to be slaughtered, the Bacon Board is to take into consideration the capacity of the home and export markets for bacon, stocks of bacon on hand and the supplies of pigs available. Where the number of bacon pigs coming forward exceeds the capacity of the home and export markets, the Board is to have power to buy surplus pigs at the prices prescribed by the Pigs Marketing Board and have them converted into bacon for storage, or exported as live pigs or fresh pork.

Other functions of the Board include research and advertising.

The operations of the Board are to be financed by a levy on curers.

(3) The prohibition of the opening of new bacon factories except under licence from the Minister for Agriculture.

Other conclusions and recommendations include:—

(4) Half-yearly enumeration of pig stocks, together with monthly information regarding the number of services of licensed boars.

(5) Development of the Irish Large White as the most suitable breed.

(6) Provision of the correct type of sow on reduced terms in districts where the introduction of fresh breeding stock is desirable.

(7) A comprehensive system of pig testing.

(8) Sale of pigs where possible on a dead weight and grade basis and the provision of scales by market authorities where sales are made by live weight.

(9) Substitution, in the northern counties, of a live pig trade for the present system of dressed pork markets for the disposal of farm killed pigs.

(10) Co-ordination of market days and selling times.

(11) By adjustments of quota or bounty rates, the maintenance of the live pig export trade under conditions at least as favourable as those obtaining for the export of pig products.

(12) Fixation of rates of bounty so as to ensure remunerative returns to pig producers from all pigs and pig products surplus to home requirements.

(13) Cold storage, in autumn, of hard cured bacon for home consumption, so as to secure a level exportable surplus throughout the year.

(14) Enforcement of uniform grade standards for all export bacon and distinctive branding of all dry cured bacon whether for sale on the home or export markets.

(15) A comprehensive system of veterinary and sanitary inspection in bacon factories.

(16) Measures to further the economical production of pigs and

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efficiency in the manufacture of bacon. In this connexion, the following calculated costs of pig production are of interest:—

	£	s.	d.
Weaner at 8 weeks	15	9	
Porker of 1 cwt. live weight at 18½ weeks ..	2	0	11
Bacon pig of 2 cwt. live weight at 29 weeks ..	3	13	5

The cost of feeding stuffs is assumed to be 7s. 6d. per cwt., and the average number of weaners reared is estimated at eight per litter. The food consumption of a bacon pig is taken as 4.17 lb. per 1 lb. live weight or 5.42 lb. per 1 lb. dead weight.

Germany: Regulation of the Trade in Eggs and Milk Products.—The German Government has recently established a comprehensive control over the trade in eggs, butter and cheese. These measures came into force on Jan. 1, 1934.

The main principles of the new system are embodied in two similar statutes of Dec. 20, 1933, one of which relates to eggs and the other to milk products. In each instance, they provide that home-produced and imported supplies may only be placed on the German market through a Reich authority which, however, is not obliged to take over all the produce offered to it. Supplies that have been duly taken over and marketed by the Reich authority, may subsequently be sold freely. The Reich authority is appointed by the Minister for Food and Agriculture, who is responsible for its general organization and control. The Minister may exempt certain classes of eggs or milk products, permanently or temporarily, from the operation of the statutes as well as petty sales and direct trade between producer and consumer. The Minister is also empowered to fix the quantities which the Reich authority may take over in any period and the taking-over and sale prices.

The decrees providing for the operation and enforcement of the statutes appoint the existing Reich Office for Oils and Fats as the Reich authority for butter and cheese, and create a special Reich Office for Eggs.

Administrative control is exercised through monopoly certificates. Under the eggs decree, persons wishing to market eggs produced in Germany must obtain a Monopoly Certificate A, entitling the possessor to sell a certain quantity after paying the difference between the taking-over and selling prices. Similarly, importers must obtain Monopoly Certificate B, which entitles the possessor to submit a certain quantity of eggs for clearance by the Customs and to bring them on the open market after payment of the difference between the taking-over and selling prices. In each case,

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when application for a certificate is made, the district in which the eggs are to be sold must be stated. The certificates are only valid in the district for which they have been issued and within the period stated in the certificates. The same procedure is adopted in the case of butter and cheese, the certificates being referred to as Monopoly Certificates D and E for home-produced and imported supplies respectively.

The taking-over price is defined as, in general, the day's price, *ex* place of production, for home-produced supplies and *ex* German frontier station, *plus* duty, for imported supplies.

As regards home-produced supplies, the selling price represents the taking-over price *plus* a prescribed charge to cover administrative costs. For eggs, this charge amounts to 1 pfennig per kilogramme or 0.06 pfg. per egg; for milk products, a charge of 2 pfg. per kg. is made for butter, 1 pfg. per kg. for cheese (except soft cheese made from skimmed milk), $\frac{1}{2}$ pfg. per kg. for soft cheese made from skimmed milk and $\frac{1}{2}$ per cent. of the taking-over price for other milk products.

As regards imported supplies, the selling price represents the taking-over price *plus* a monopoly tax, equivalent to the whole of the estimated difference between German and world prices. The following rates have been fixed for all imports as from Feb. 1, 1934:—

- | | |
|------------------|---|
| (a) Butter | 60 pfg. per kg. |
| (b) Cheese | Not in packets weighing $2\frac{1}{2}$ kg. or less,
from 10 pfg. to 24 pfg. per kg., according
to kind, except Parmesan and
Rocquefort cheese. |

Of other kinds, the administrative charge
applicable to home-produced supplies
only.

- | | |
|----------------|-----------------|
| (c) Eggs | 13 pfg. per kg. |
|----------------|-----------------|

These charges will be varied by the monopoly authorities, from time to time, according to price fluctuations.

The Reich Office for Milk Products, Oils and Fats and the Reich Office for Eggs will allocate quantities for import during 1934 to those countries that formerly had import or Customs quotas for milk products and eggs.

For butter, the Reich Office will issue import certificates for a total of 45,000 metric tons. This total will be divided among the individual countries in the same proportion as their individual quotas for 1933.

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For cheese, the import quota for hard cheese for 1934 will be 50 per cent. of the average imports in 1931-32.

The import quota for eggs in 1934 will be 40 per cent. of the quantities exported by each supplying country in 1932.

Monopoly Certificates relating to butter, hard cheese and eggs will be issued by the Monopoly Offices monthly for one-twelfth of the reserved monopoly shares in each of these products. Applications for Monopoly Certificates must be made by importers by the 20th of each month for the following month. Applications submitted after that date will only be considered in respect of any parts of quotas still remaining for allotment.

The allocations made to the United Kingdom for the year 1934 are as follows:—

			<i>Yearly</i> (<i>Metric tons</i>).	<i>Monthly</i> (<i>Metric tons</i>).
Butter	..	..	2.6	0.2
Cheese	..	..	485.9	40.5
Eggs	..	..	8.8	0.7

The allocations accorded to Australia, New Zealand and Canada are as follows:—

			<i>Yearly</i> (<i>Metric tons</i>).	<i>Monthly</i> (<i>Metric tons</i>).
Australia:	Butter	..	206.3	17.2
New Zealand:	Butter	..	79.7	6.7
	Cheese	..	10.3	0.9
Canada:	Butter	..	0.3	0.03
	Cheese	..	4.8	0.4

The provisions relating to the fixation of prices and the organization of the marketing of domestic supplies constitute an important feature of the new legislation. In each instance, the executive authority is to be the Reich Food Commission, the creation of which by the Minister for Food and Agriculture was authorized under the statute of Sept. 13, 1933, for the purpose of regulating "the production, sale prices and price margins of agricultural products."

The Reich Food Commission is empowered in a special decree for the regulation of the egg market to (a) prescribe the extent to which producers' supplies are to be delivered to local collecting stations and marked; (b) organize marking stations and district centres for the collection and distribution of local supplies; (c) require the Egg Marketing Corporation, if the operations of the Reich Egg Office are inadequate to establish equilibrium between surplus and deficiency areas, to organize in conjunction with the Reich Egg Office, the holding of stocks; (d) introduce other

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measures for regulating and promoting the sale of eggs; (e) nominate district controllers to supervise and carry out the measures enumerated in (a) to (d) inclusive. If the Reich Food Commission makes use of these powers, it can fix the prices at which the collecting and marking stations, the district centres and the Egg Marketing Corporation shall take over and sell eggs and the price margins that shall be binding on the trade. It may also transfer its powers of fixing local and district prices to the district controllers and empower them to ensure that the prices and margins are observed.

The orders made by the Reich Food Commission are subject to the approval of the Minister for Food and Agriculture or an authority designated by him.

The powers conferred upon the Reich Food Commission under the milk products decree are less extensive. It is empowered to fix prices and price margins for butter and cheese subject to the approval of the Minister for Food and Agriculture. Sales of butter and cheese to hotels, hospitals, educational establishments and similar institutions and forced sales are excluded from these provisions.

MARCH ON THE FARM

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IN many parts of the country, Lady Day (March 25) is the starting point of a new farming year, and it may be well to consider what the prospects are for the future. There is a growing feeling of confidence amongst those who are established, while the reorganization that is taking place in many spheres of marketing offers a measure of guidance to those who are just assuming farming responsibilities. Successful farming is dependent upon such a combination of factors. It is necessary to recognize that much depends upon the farmer, as represented by his capacity for work and for organizing labour; by his sound judgment in the buying of stock and by his knowledge of economic feeding and management of crops and stock. Good training counts for much in the equipment of the young farmer, and it is far better to spend time in acquiring this than in the purchase of experience at the cost of limited capital.

One of the first essentials is to know thoroughly the whole routine of farming practice. It is not enough to know how jobs should be performed in theory, but to be able to do them for oneself. Equally desirable is a variety of farming experience. Too often the sons of farmers are handicapped in this respect, and a scheme that would allow for the exchange of farmers' sons would frequently provide young farmers with more solid foundations.

The influence of agricultural education in the training of young farmers is now emphasized in all directions, including the work of Young Farmers' Clubs, organized day classes in the theory and practice of agriculture; agricultural discussion societies; and the junior section of the National Farmers' Union. Farm Institutes, Agricultural Colleges, and many of the University Departments of Agriculture have instituted short courses of instruction in the principles and practice of agriculture and kindred subjects that cater specially for those who are to engage in farming.

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It was a debatable topic at one time as to whether a College course should be taken just after leaving school or after a period spent in learning the practice of farming. The greatest value is probably derived when the foundations of practical farming have been well laid. The majority of these educational activities are quite properly confined to the autumn and winter months when the pressure of farm work is least felt.

Seasonal Topics.—Keen east winds, frequent ground frosts and rather dry weather are generally characteristic of March. The lengthening days and the increase in sunshine bespeak conditions suitable for a revival of serious land work. Where the farming interests are mixed, this is particularly a month of hustle, for live stock are still demanding their full share of attention. On the purely arable farms where live stock are fattened on the produce of the land, the load is usually lightened by the disposal of fat cattle and sheep as they reach the appropriate degree of fatness. The arable operations that will principally claim attention concern the sowing of oats and barley, silage and forage mixtures, and in suitable areas the planting of early potatoes.

The state of the soil must be regarded as of primary importance in the making of seedings. Weather conditions generally have been so remarkably dry during the present winter that one is inclined to wonder whether March will be a wet month this year. Nothing is worse for the delay of seedings than heavy rain. Correct anticipation is worth a lot in farming practice, but what applies to one soil and district does not necessarily operate in another. Where free-working soils and satisfactory drainage obtains, then early sowings can usually be made with every prospect of success. The rapid germination of early-sown spring corn is very much dependent on the existence of mild days, though it is not unusual for germination and rapid growth to be held up at this stage by very dry soil conditions.

March is usually a suitable month also for the rolling of wheat. The importance of a consolidated soil for this crop cannot be over-estimated, but the exact date of rolling is of less significance than that the ground should be in a fit state for the job to be done. The work on root-crop fallows concerns cross-ploughing if this has not been done already. In

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most cases it is desirable not to leave this operation too late, especially on soils where tilth formation gives rise to difficulties. Where roots are grown on ridges it is an advantage if the land is worked down and ridged some time before seeding. This gives an opportunity for weed seeds to germinate, the seedlings being destroyed by chain harrowing the ridges preparatory to sowing. The ridge cultivation of roots is adapted to regions of fairly high rainfall, although it is interesting to note that mangolds are now being grown successfully on the ridge even in areas where summer rainfall is relatively low. At the Midland College, this system has been partly utilized as a means of receiving cow and pig manure. The land is mostly free-working with satisfactory drainage. Ridges are frequently drawn as early as December or January and the manure is applied direct in the bottom of the ridges and covered by splitting the ridges. Such a method is a satisfactory means of utilizing a somewhat sloppy manure that cannot always be satisfactorily stored in an open clamp. This system of direct application also ensures that the ground receives the full manurial constituents.

Grass Land.—In the eastern Midlands the growth of grass is normally absent or at the most very slight in March, owing to the prevalence of keen winds and frosts. This is equally true of pastures that have been top-dressed with nitrogen, though these begin to assume a deeper green colour. Chain harrowing and rolling are both appropriate operations, though in most instances harrowing is emphasized at the expense of rolling. There are no hard and fast rules concerning rolling. There is a general impression that a consolidated turf produces a sweeter and greener type of herbage, as is illustrated by the appearance of a footpath through a field. Other factors contribute to this result, however, and it would not be a safe deduction that rolling is thereby a necessity. It is probably a desirable operation on the lighter soils, though it is customary to regard it with stone-picking as one of the preliminary treatments for fields that are to be laid up for hay. A level surface is always more satisfactory for the easy running of the mowing machine, but it follows that a suitable time must be chosen for the practice of rolling, and that sufficient weight must be employed to produce the necessary smoothness of surface.

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The choice of fields for hay is frequently decided upon in March. In some parts of the country, fields intended for hay are changed year by year. The desirability of this course has long been debated by farmers, but the consensus of opinion favours the system of permanent meadows as distinct from alternating meadow with pasture. Variation is sometimes desirable, however, since it is the simplest way of eradicating some weeds that may prove troublesome under pasture or meadow conditions. Thus, pastures thickly populated with thistles are frequently improved by converting these to mowing fields for a year or two. Similarly, fields infested with Yellow Rattle can be rectified by pasturing for a period of years.

The renovation of grass land that has become open in the bottom as the result of the disappearance of sown species can frequently be attempted during this month. This is a practice that gives very variable results. To be successful, it necessitates that the land should be improved in fertility by appropriate manuring, and that a suitable mixture of renovating seeds is employed. In the writer's experience wild white clover has proved to be the most important ingredient of such mixtures, and sown alone in such cases at the rate of $\frac{3}{4}$ to 1 lb. per acre will frequently give satisfactory results. A rather more general mixture should be employed for patching up the ground that has been badly trodden by live stock in the vicinity of gateways. On newly-seeded pastures treading is usually severe after winter stocking, and this is the one serious objection to using pastures of this kind as exercising ground for dairy cattle throughout the winter. There is much to be said for keeping dairy cows off such land, and they will usually obtain all the exercise they need if turned into a hard-bottomed yard. This is in fact far preferable to the cows hovering round gateways that may be almost knee-deep in mud. If the ground that has been ruined in this fashion is not renovated with a suitable seeds mixture, then it frequently becomes the site of worthless weeds for the rest of the summer.

The Sowing of Grass Seeds.—In most years farmers come across instances of unsatisfactory "takes" of grass and clover seeds. The blame is often wrongly attached to the seeds mixture employed, when in reality other factors are responsible. The purity and germinating capacity of

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farm seeds can now be taken more or less for granted: the Seeds Act has proved an effective safeguard in this respect. There is, however, no similar standardization as regards the methods employed for sowing or of the actual conditions that obtain in the preparation of the seed bed.

In most instances grass and clover seeds are sown in a cereal nurse crop. Wheat is usually regarded as the most suitable, with barley and oats following in that order of merit. The growth habit of the nurse crop has an important influence on the success or otherwise of the seeds mixture. Thus varieties that tiller profusely and are therefore thick in the bottom leave little room and light for the healthy development of young grass and clover plants. Some of the older varieties of oats were particularly noted for this, and in addition tended to lodge badly on soils in high fertility. It is still a point worth noting that the selection of a stout-strawed variety of oats as a nurse crop may contribute greatly to a successful take of seeds. Marvellous claims particular attention on these grounds, since apart from its desirable habit of growth it stands up to highly fertile conditions. Generous nurse crop seedings are also apt to be against the best interests of young seeds. The use of rape as a nurse crop has been successfully employed, particularly on hill farms in wet climates, but its use is not always looked upon with favour on account of the stalks that are left after the crop has been cleared by sheep.

It is desirable to recognize the necessity for providing a suitable tilth in which to bury grass and clover seeds. In actual practice this forms the basis of successful seeding. The most desirable combination is a consolidated soil, with an ample moisture content, yet with a surface that is particularly fine. Consolidation is generally held to be one of the most important points, and it is interesting to remember that it is a condition equally agreeable to the cereal nurse crops. The writer normally utilizes spring cereals as nurse crops, and the use of the Cambridge roller is particularly effective in giving the necessary consolidation. Incidentally, as the grass and clover seeds are distributed by means of a seed barrow, the slightly ridged ground after ring rolling gives an ample covering of soil when the seeds are harrowed in. Considerable importance is now attached to securing a complete covering of fine soil over the grass and clover seeds. This, however, must not be too deep, and it

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is probable that the use of the coulter drill for the sowing of grass and clover seeds leads to irregular results owing to a tendency to sow too deeply.

The time of sowing varies somewhat with the locality. In the east Midlands it is the normal practice to sow "seeds" after the nurse crop is well established. This may be during April and the first half of May. It is equally possible to sow the small seeds before the nurse crop has appeared above ground. This will usually be during March. There appear to be no serious objections to either method, though it is sometimes held that with early sowing the young clover plants may be damaged by frost, or if the conditions are very favourable for growth they may develop at the expense of the nurse crop, and cause difficulties at harvest time. Against late sowing, there is the danger that drought may prevent normal development.

NOTES ON MANURING

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Farmyard Manure.—After many generations of practical experience there remains no doubt in the minds of present-day farmers as to the benefits that accrue from the use of farmyard manure. The reliance that is placed on dung for the maintenance of soil fertility is illustrated in the following figures from the survey of over one thousand farms in the Eastern Counties of England in 1931. On these farms dung was available at the rate of three loads per acre of arable land, while expenditure on purchased fertilizers amounted to 4s. per acre of crops and grass. The former might weigh approximately 40 cwt. and cost 10s. to 20s. by the time it reached the land, the latter about 1 to 1½ cwt. costing 5s. to 6s. While, however, there is almost complete agreement regarding the high value that should be placed to the credit of farmyard manure, there is the greatest diversity in the manner of its production, storage, application and use. A few leading points may be briefly noted.

Production.—Dung produced by farm stock that are housed, varies greatly in value according to the class of animals, the feeding of the animals, and the amount and nature of the bedding used. Apart from poultry, the richest manure is derived from bullocks and pigs fed lavishly on protein-rich foods, and the poorest from store cattle receiving a subsistence ration of straw, hay and roots. Abundance of straw as litter may result in manure of low analysis which yet fulfils a very desirable function by increasing both the quantity of manure and its value as a source of highly-prized organic matter. Peat moss litter tends to give a richer manure because of its high absorptive power, but sawdust and wood shavings are less satisfactory.

Apart from dung produced on farms, supplies are still obtainable from London and other cities, although at enhanced prices owing to the displacement of horses by

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motor vehicles. The lower grades are largely used by potato growers and market gardeners, while select lots are in demand for use in hot beds. High initial costs and the expenses of carting and handling are, however, stimulating the use of, and the search for, substitutes, whether in the form of artificial farmyard manure (e.g., the Adco process), green manuring, or the introduction of other sources of heat for hot beds.

Storage and Folding.—The principles that should be applied to retain in the manure the maximum amount of its original fertilizing value, especially the unstable nitrogenous constituents, are briefly, the prevention of leaching by rain, and the exclusion of air from the heap. Loss is reduced to a minimum when the dung is stored under cover and kept tightly trodden down by cattle, and is at its maximum when the dung is left in small heaps and exposed to wind and rain. There are many intermediate practices between these extremes. For example, manure from a cowshed may be accumulated in a covered shed, kept trodden by cattle or pigs, and moved but once before it is applied to the land. There are, however, many farms where this kind of manure passes through three or four stages before it is finally ploughed into the soil. A period of storage in loose heaps may be followed by cartage to a clamp from which the dung is put out later into heaps on the field and finally spread over the surface of the ground. This method involves handling a very heavy material many times, and is, in addition, responsible for very substantial losses of the most valuable constituents. Expensive as this method is, it is not always avoidable, and the best that can be done in some cases is to make the heaps near the cowshed and in the field as compact as possible.

Another point on which considerable emphasis needs to be placed is the importance of ploughing in the dung as soon as possible after carting to the field: only by doing this can a further large loss of the most available nitrogen be avoided. The ideal is to have cartage, spreading, and ploughing as almost simultaneous operations and the farmer should endeavour to get as near as possible to this ideal. With the same object of preventing waste the plough should also follow closely behind stock folded on arable land.

Alternatives to Storage.—An alternative to storage is the system of folding, whether in relation to sheep, pigs or

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poultry. If circumstances have led to a lesser use being made of the "Golden Hoof," greater attention is now being given to the use of pigs and poultry as possible agents for the distribution of manure just where it is required. Portable huts and hurdles (the latter of a type requiring no stakes) greatly increase the chances of success in folding pigs on arable or grass land, while a system of tethering sows recently invented by a farmer in Hertfordshire has a great deal to commend it, under certain circumstances. Similarly, there is no reason why the folding units for poultry which are now on the market should not be used or adapted to suit farm conditions. Both pigs and poultry will be healthier and more profitable when managed on a system which ensures that they are constantly kept on fresh ground, and the incidental distribution of the manure presents a really valuable additional attraction.

Application.—Considering the continuous use that has been and must always be made of farmyard manure, it is remarkable that there has been so little progress in the invention of more economical methods of handling it. Under conditions of cheap labour, the dung cart was the standard way of finding employment in slack times for the farm staff, but labour is now relatively so dear that there is an urgent need for cheaper methods of handling dung. Various types of dung spreaders were invented many years ago, but neither these nor the modern type of spreader from the United States of America have come into general use, although the latter can *spread* its load of 24 cwt. in the same time that it takes to *unload* a cart load of 18 cwt. into heaps over the field. The chief merit of the modern spreader lies not so much in reducing costs, as in getting the work done more expeditiously when the conditions and the weather are favourable, and in making its execution a much less laborious task. For the spreading of semi-rotted or rotted manure, there is no doubt of the efficiency of these machines, but they cannot handle long straw manure direct from the cowshed.

It is also of interest to note that if straw dung is ploughed into the soil when absolutely fresh, that is, when not more than a day or two old, it may actually have a depressing effect on crop yields, whereas dung that has been stored for a month or two gives the largest increase of crop.

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Time and rate of application are also subject to many variations. Spring application for potatoes and roots is often favoured in the north, but for convenience and results autumn application is preferred in the south.

As to quantity, there is ample experimental evidence in support of moderate dressings of 12-15 tons per acre combined with artificials, rather than double this quantity of dung by itself. Nevertheless, the market gardener who is engaged in the intensive production of a succession of vegetables, may well be justified in adhering to applications at the rate of 40 or even 60 tons per acre if only because of the high water-retentive properties that are thus given to the soil. In glasshouses, on the other hand, where the watering of plants is under direct control, more moderate quantities have proved equally satisfactory.

Old and New Customs.—In the Eastern Counties it has been found that two-thirds of the dung available was put on fallow crops, the remainder being almost wholly absorbed by wheat, grass and beans. Local custom is usually a deciding factor as to where the manure should be used. Many arguments might be given in support of the application of dung to such crops as potatoes, roots, cabbage, kale, etc., but there seems to be a certain incongruity in the use of dung for wheat after fallows, for beans and clover, and perhaps also on grazing land. Nevertheless, these customs are founded on such long experience that they should not be adversely criticized without substantial evidence to show that they are uneconomic. For grass land, the use of dung may be very detrimental to the quality of the herbage under one set of circumstances, and quite satisfactory in maintaining both quality and quantity under another.

Lastly, there are recorded instances of many years' successful cropping, including continuous wheat growing, without the use of any dung. These results are likely to be extensively tested in the course of the next few years by those who have adopted a system of farming limited to the growing of cereals under mechanized conditions without stock of any kind.

Nitrogenous Manures for Hay.—Owing to the exceptionally dry weather last year many an old haystack that appeared to have become a permanent feature of the land-

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scape has already been consumed, and there will therefore be a desire to replenish reserves by means of a bigger hay crop this year. A wet spring might in itself be sufficient to ensure a bumper crop, but as the weather cannot be relied on it is as well to make use of other aids.

It has been estimated that on the average 1 cwt. of sulphate of ammonia (or its equivalent in other manures) should give an additional 8 or 10 cwt. of hay. In this connexion the following results of experiments carried out for three years in succession on *different* meadows of the same farm in east Hertfordshire may be of interest. In each year there were five treatments: no nitrogen, sulphate of ammonia, cyanamide, nitrate of soda and nitro-chalk, all dressings being equivalent to 1.5 cwt. of sulphate of ammonia: each treatment was repeated five times in the form of a Latin square. The manures were applied in March. The figures are cwt. per acre.

<i>Treatment.</i>	<i>Nil.</i>	<i>S.Amm.</i>	<i>Cyan- amide.</i>	<i>Nitrate of Soda.</i>	<i>Nitro- Chalk.</i>	<i>Mean.</i>	<i>Standard Error of Mean.</i>
1930	60.5	72.1	69.0	66.0	70.75	67.7	1.75
1931	35.7	44.6	38.35	44.8	42.5	41.2	1.5
1932	38.8	52.0	43.6	47.8	49.3	46.3	2.2
Average	45.0	56.2	50.3	52.8	54.2	51.7	
Av. increase due to N.	—	11.2	5.3	7.8	9.2	8.4	
Av. increase per cwt. of S.A. equivalent	—	7.5	3.6	5.2	6.1	5.6	

In the first year when, even on the no-nitrogen plot, the crop reached the 3-ton level, the nitrogenous fertilizers yet gave an average response, cyanamide doing extremely well in this year. Over the three years, however, cyanamide takes a definitely inferior position, while the differences between the others are not sufficiently great to be regarded as significant. Omitting cyanamide, the average increase due to 1 cwt. of sulphate of ammonia (or its equivalent in nitrate of soda or nitro-chalk) was 6.3 cwt. of hay. This, for a rather poor type of permanent grass, may be considered a very satisfactory return, though not up to the estimated average quoted above. Like so many other experiments on grass, these suffered from two serious defects: the quality of the hay was not estimated in any way nor was the growth of aftermath measured. Had these two points been taken into consideration it is possible that

NOTES ON MANURING

the relative positions of the different fertilizers might have been changed.

Signs of Nutrient Deficiencies in Market Garden Crops.—In the notes last month it was suggested that market garden crops could be divided into those that benefited by fresh farmyard manure and those that were best grown on ground well manured from a previous crop. A general dressing of artificials was also suggested.

The most economical and satisfactory mixture of artificial manures must depend on local soil and climatic conditions, and the previous treatment of the ground, as well as on the type of crop being grown. In general, growers should be able to tell by the appearance of the plants whether the manures supplied are giving the kind of growth that is required, and able also to detect which of the three main plant foods have been deficient.

Thus, deficiency of nitrogen results in a stunted growth and a yellowing of the leaves from the midribs outwards, the veins themselves remaining green. A large supply of nitrogen causes rank growth, a dark green colour and late ripening.

Plants from ground well supplied with phosphates show a well-developed root system and early ripening may also be observed. Phosphorus deficiency is rather difficult to detect, but with cabbages, brussels sprouts, etc., is usually shown by a bluish appearance of the foliage.

Deficiency of potassium is often shown by a yellowing of the leaf from the margin inwards; the edges turn brown and produce a condition commonly known as "scorch." This is especially noticeable with gooseberries, apples, tomatoes, etc., but certain diseases and also waterlogged soil may produce a rather similar effect.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended February 14				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	7 18d	7 18d	7 18d	7 18d	10 2
„ „ Granulated (N. 16%) ..	7 18d	7 18d	7 18d	7 18d	9 9
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	7 5d	7 5d	7 5d	7 5d	7 0
Calcium cyanamide (N. 20.6%)	7 4e	7 4e	7 4e	7 4e	7 0
Kainit (Pot. 14%) ..	3 6	3 0	2 17	3 0g	4 3
Potash salts (Pot. 30%) ..	5 4	5 1	4 17	5 0g	3 4
„ „ (Pot. 20%) ..	3 15	3 9	3 6	3 10g	3 6
Muriate of potash (Pot. 50%)	9 8	9 1	8 15	9 2g	3 8
Sulphate „ „ (Pot. 48%)	10 12	10 7	10 0	10 7g	4 4
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26.27½%) ..	2 5a	2 5a	2 2a	2 5a	1 8
Superphosphate (S.P.A. 16%)	3 2	..	3 2f	2 16k	3 6
„ „ (S.P.A. 13½%)	2 17	2 11	2 18f	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	7 15	6 15f	6 15f	6 7	..
Steamed bone-flour (N. 4%, P.A. 27½-29½%) ..	5 5	5 12	5 10f	5 7	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid
Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid price.

§ Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. price. Fineness 80% through standard sieve.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

k Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. A. STEWART, M.A., B.Sc., (Agric.),
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Potatoes in Stock Feeding.—Potatoes are apparently quite as abundant in certain Continental countries as in Britain, and growers are finding it impossible to dispose of the whole of their output for human consumption. Much attention is being given to the possibilities of utilizing potatoes more largely in stock feeding. In this country surplus potatoes are used mainly for feeding to pigs, and, to a lesser extent, to cattle. Results of an experiment conducted in the feeding of potatoes to farm horses comes from Breslau. The experiment involved feeding the potatoes to one of the horses in each of several pairs, while the other horse of each pair was regarded as the control. This is a usual method employed in nutrition experiments on farm horses in Scandinavian countries. In this instance, the two members of a pair team did as far as possible the same amount of work, but where this was found impracticable, elaborate corrections were made in order to ascertain the true effect and value of the food consumed. All the horses were weighed three times daily, as apparently in previous experiments it had been found that a single daily weighing scarcely provided sufficient data on which to base completely accurate results. The investigators suggest, however, that where single daily weighings are relied upon in feeding tests of this nature, these weighings should be made first thing in the morning before the early morning feed. The weights obtained from three weighings daily are, however, less dependent upon accident, than where one weighing only is practised. Owing to continuous refinement in experimental technique, it is claimed that the value of the food in energy and weight production can be accurately gauged.

The potatoes were fed after being steamed and were given with straw chaff. It is stated that it is important that the chaff should be about 2 in. long, in order to stimulate chewing and the secretion of saliva, and to secure the right consistency in any chewed mouthful of food. It was found that 3 lb. of steamed potatoes, together with 1.2 oz. of soya

NOTES ON FEEDING

bean meal to provide the necessary protein, replaced 1 lb. of oats in the feeding of farm horses. No troubles were found to arise from this type of diet; throughout the period of experiment the horses were active, lively, and in good form, while their coats and skins presented that healthy and sleek appearance that is indicative of good health. It is of particular interest to note that 1.2 oz. of soya bean meal proved suitable as regards proportion and source of protein to balance the protein deficiency in 3 lb. of potatoes. Pig feeders who use steamed potatoes might find useful guidance from the foregoing data. Potatoes are low in protein and it is essential that an adequate protein supplement should be given with them if their full feeding value is to be obtained.

Potato flakes have been used successfully in Continental trials in the fattening of cockerels and in the mash for laying hens. In the latter instance, potato flakes to the extent of 25 per cent. of the mash, i.e., 12.5 per cent. of the total ration, gave as good results as an equivalent quantity of maize. Steamed potatoes have also given entirely satisfactory results in poultry fattening where the protein ratio was suitably adjusted.

Soft Fat in Bacon Pigs.—Deductions from the prices paid for pigs, made by bacon factory firms on account of softness of fat, was mentioned in "Notes on Feeding," for January last, as having caused disappointment among bacon-pig producers. It was there pointed out that rations containing more than a small percentage of oil are a common cause of softness, and it was recommended that the percentage of oil in the ration should not exceed 3 per cent. of the digestible matter. The writer has recently been in touch with the Brierley Hill Factory in regard to a particular case where soft fat occurred, and, arising out of discussion over that case, and of an experiment conducted by the factory, it is now possible to amplify the recommendation previously made.

In the experiment referred to, the pigs in the control pen were fed on a ration containing at the outset 3.5 per cent. of oil gradually falling to 3 per cent.; whereas, in the experimental pen, the oil commenced at 4 per cent. and gradually fell to 3.25 per cent. It is necessary to note that these oil percentages are calculated as digestible oil, per cent. of total

NOTES ON FEEDING

digestible matter. The bacon and hams from the control pen were firm in the fat, but those from the experimental pen were soft.

Based partly on these results, the factory is now recommending the following oil values as representing safety limits—namely 3.5 per cent. for weaners, 3.25 per cent. in intermediate rations, and 3 per cent. for finishing; these figures roughly correspond to 2.5 per cent. of *total* oil in the rations, and this can be taken as a useful working figure. It is necessary to make clear, however, that a ration which produces firm fat under one set of conditions may not do so under different conditions; similarly the amount of back fat is also influenced by conditions. Rations which, in the summer months, were producing carcasses graded A or B as regards fat, are, in many instances, in the winter feeding period, giving carcasses of lower grade. This has given rise to some dissatisfaction and anxiety on the part of pig feeders, but the result is not abnormal and can be explained by the effect of temperature. When pigs are kept reasonably warm as in summer, they normally develop less fat; under more wintry conditions, the pig tends to put on fat as a protection against cold. Rations which give perfectly satisfactory results in warm houses of the Scandinavian type, particularly in those which are artificially heated, are found to produce carcasses with considerably more fat when the pigs are kept in cold, damp, or draughty houses. Housing and feeding in their effect upon carcass quality are intimately connected, and if producers are to secure high-grade carcasses, as regards back fat in winter, it is essential that attention should be given to the regulation of temperature in the houses and the general comfort of the pigs.

Correctly-balanced rations give less trouble, both as regards quality and amount of fat, than unbalanced ones; pig feeders contracting for the supply of bacon pigs will find it of fundamental importance to give close attention to the correct balancing and mixing of rations.

In the particular case of soft fat mentioned above, five carcasses out of a consignment of twenty pigs showed softness of fat. The rations contained 10 per cent. of meat meal and had been correctly balanced on the assumption that the meat meal contained 10 per cent. oil. On investigation, however, it was found that the meat meal contained, not 10 per cent., as invoiced, but nearly 20 per cent. This

NOTES ON FEEDING

extra and unexpected amount of oil in the meat meal had raised the total oil to just over the limit of safety recommended by the factory, as defined above. This instance provides a warning to feeders as to the need for care in checking the amount of oil in the ingredients of rations. Meat meal and rice meal in particular should be watched in this respect.

In the Ministry's Advisory Leaflet No. 104, "Pig Feeding," certain rations are recommended. In order to guard against the possibility of the carcass being tainted, and in deference to representations from the pork and bacon trades, meat meal was recommended in place of fish meal as the source of animal protein. Meat meal should be carefully watched, however, as regards percentage of oil; blood meal, which is very low in oil, would be generally a safer alternative. As a source of vegetable protein, decorticated ground-nut-meal was given in preference to soya bean meal (ext.) because the former comes mainly from within the Empire. There is some doubt, however, whether decorticated ground-nut-meal is giving equally satisfactory results as regards growth and general health, while it is definitely risky if it contains oil in such quantity as to raise the total oil in the ration above the safety limit.

The grading of carcasses under the Bacon Scheme is providing information regarding a number of factors which influence carcass-quality. Accurate feeding practice, checked against the grading results obtained at the factories, should provide workers with valuable fresh data. There is obviously still much to be done in perfecting the technique of feeding and management in regard to bacon pigs.

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	4 10	0 8	4 2	72	1 2	0.62	9.6
Barley, British feeding	5 15	0 8	5 7	71	1 6	0.80	6.2
" Argentine	4 7 ⁸	0 8	3 19	71	1 1	0.58	6.2
" Danubian	4 15	0 8	4 7	71	1 3	0.67	6.2
" Persian	4 12*	0 8	4 4	71	1 2	0.62	6.2
" Russian	4 18	0 8	4 10	71	1 3	0.67	6.2
Oats, English white	6 13	0 9	6 4	60	2 1	1.12	7.6
" black and grey	6 13	0 9	6 4	60	2 1	1.12	7.6
" Scotch white	6 10†	0 9	6 1	60	2 0	1.07	7.6
" Canadian No. 2 Western	7 7	0 9	6 18	60	2 4	1.25	7.6
" mixed feed	5 17	0 9	5 8	60	1 10	0.98	7.6
" Argentine	6 17	0 9	6 8	60	2 2	1.16	7.6
" Chilian	6 15	0 9	6 6	60	2 1	1.12	7.6
" Russian	6 15	0 9	6 6	60	2 1	1.12	7.6
Maize, Argentine	4 13	0 7	4 6	78	1 1	0.58	7.6
" Gal. Fox	4 18†	0 7	4 11	78	1 2	0.62	7.6
" Russian	4 15†	0 7	4 8	78	1 2	0.62	7.6
Beans, English Winter	5 15 ⁸	0 16	4 19	66	1 6	0.80	19.7
Peas, Japanese	21 15†	0 14	21 1	69	6 1	3.26	18.1
Dari	7 5†	0 7	6 18	74	1 10	0.98	7.2
Milling offals—Bran, British	5 2	0 15	4 7	43	2 0	1.07	9.9
" broad	6 0	0 15	5 5	43	2 5	1.29	10
Middlings, fine imported	5 5	0 12	4 13	69	1 4	0.71	12.1
Pollards, imported	4 15	0 13	4 2	62	1 4	0.71	11
Meal, barley	6 7	0 8	5 19	71	1 8	0.89	6.2
" grade II	5 12	0 8	5 4	71	1 6	0.80	6.2
" maize	5 12	0 7	5 5	78	1 4	0.71	7.6
" germ	5 15	0 11	5 4	79	1 4	0.71	8.5
" locust bean	7 0	0 5	6 15	71	1 11	1.03	3.6
" bean	7 15	0 16	6 19	66	2 1	1.12	19.7
" fish	16 0	1 19	14 1	59	4 9	2.54	53
Maize, cooked flaked	6 0	0 7	5 13	84	1 4	0.71	9.2
" gluten feed	5 17	0 12	5 5	76	1 5	0.76	19.2
Linseed cake, English, 12% oil	9 5	0 19	8 6	74	2 3	1.21	24.6
" " " 9% "	8 17	0 19	7 18	74	2	1.16	24.6
" " " 8% "	8 12	0 19	7 13	74	2 1	1.12	24.6
" " " 7% "	8 17 ⁸	0 19	7 18	74	2 2	1.16	24.6
" " " 6% "	8 17 ⁸	0 19	7 18	74	2 2	1.16	24.6
Soya-bean cake, 5½% oil	8 2*	1 7	6 15	69	1 11	1.03	36.9
Cottonseed cake—English, Egyp- tian seed, 4½% oil	4 10	0 18	3 12	42	1 9	0.94	17.3
" " " 4½% oil	4 1	0 18	3 3	42	1 6	0.80	17.3
" " " decorticated, 7% "	6 12†	1 7	5 5	68	1 7	0.85	34.7
" " " meal, decorticated, 7% "	6 10†	1 7	5 3	68	1 6	0.80	34.7
Coconut cake, 6% oil	5 17	0 17	5 0	77	1 4	0.71	16.4
Ground-nut cake, 6-7% oil	5 17 ⁸	0 18	4 19	57	1 9	0.94	27.3
" " " decor., 6-7% oil	7 0	1 7	5 13	73	1 7	0.85	41.3
" " " imported, decorticated, 6-7% oil	6 2	1 7	4 15	73	1 4	0.71	41.3
Palm-kernel cake, 4½-5½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " " meal, 4½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " " meal, 1-2% oil	5 5	0 12	4 13	71	1 4	0.71	16.5
Feeding treacle	5 0	0 8	4 12	51	1 10	0.98	2.7
Brewers' grains, dried ale	5 0	0 10	4 10	48	1 10	0.98	12.5
" " " porter	4 17	0 10	4 7	48	1 10	0.98	12.5
Dried sugar beet pulp (a)	5 0	0 5	4 15	66	1 5	0.76	5.2

(a) Carriage paid in 5 ton lots. *At Bristol. §At Hull. †At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of January, 1934, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 109 per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.29d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N, 6s. 11d.; P₂O₅, 2s. 6d.; K₂O, 3s. 8d.

FARM VALUES OF FEEDING STUFFS

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent Per cent.</i>	<i>Protein equivalent Per cent.</i>	<i>Per ton £ s.</i>
Barley (imported)	71	6.2	4 13
Maize	78	7.6	4 15
Decorticated ground-nut cake ..	73	41.3	7 0
" cotton cake ..	68	34.7	6 12

" (Add 10s. per ton, in each case, for carriage.)

The cost per unit starch equivalent works out at 1.26 shillings, and per unit protein equivalent, 1.51 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1933, issue of the Ministry's JOURNAL, p. 784.)

FARM VALUES.

Crop	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9.6	5 5
Oats	60	7.6	4 7
Barley	71	6.2	4 19
Potatoes	18	0.8	1 4
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 9
Beans	66	19.7	5 13
Good meadow hay	37	4.6	2 14
Good oat straw	20	0.9	1 7
Good clover hay	38	7.0	2 18
Vetch and oat silage	13	1.6	0 19
Barley straw	23	0.7	1 10
Wheat straw	13	0.1	0 17
Bean straw	23	1.7	1 12

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d. net.

MISCELLANEOUS NOTES

Trials of Potatoes for Immunity from Wart Disease, 1933

THE trials which are arranged each year by the Ministry with the object of testing new varieties of potatoes for immunity from Wart Disease were again conducted in 1933 on the farm of the National Institute of Agricultural Botany, Ormskirk, Lancashire. The actual field operations and the taking of records were carried out by Mr. Harold Bryan, B.Sc., and Mrs. McDermott, of the Institute, but the trials were conducted on a plan approved by the Ministry.

Forty stocks were included in the second and subsequent years' tests, none of which developed Wart Disease. Of the 48 entries for the first year's tests, 5 became infected in the field; 3 proved to be synonyms of existing varieties; 2 were too poor to judge and 43 were distinct varieties.

As in previous years, the results of the trials have been considered by a small committee composed of representatives of the Ministry of Agriculture and Fisheries, the Department of Agriculture for Scotland and the Ministry of Agriculture for Northern Ireland, and co-ordinated with the results of the trials carried out by the two last-named Departments at Philpstoun and Kilkeel respectively.

The Committee recommended the approval of 26 new varieties, but only 2 of these have actually been added to the approved list. In the remaining cases inclusion has been postponed until such time as the raisers have intimated that the varieties have actually been or will shortly be introduced into commerce. Descriptions are given below of the new varieties, together with that of another variety which was approved as the result of trials carried out previously and which is now being introduced into commerce.

The findings of the Potato Synonym Committee of the National Institute of Agricultural Botany have been accepted by the Ministry where recommendations as to the classification of new varieties as synonymous with existing varieties have been made by that Committee.

A list of the names of the more commonly grown varieties which have been approved as immune from Wart Disease may be obtained on application to the Ministry.

MISCELLANEOUS NOTES

SECOND EARLY VARIETY.

"Clar Innis"

<i>Sprout</i>	..	Pink.
<i>Tuber</i>	..	Round to oval; skin white; flesh white; eyes shallow.
<i>Haulm and Foliage</i>		Upright, medium height to tall; stem strong, tinged red-purple towards maturity; wings straight; leaflets medium green, dull and large; leaflet stalks long; secondary leaflets rounded and numerous, one large pair attached to or close behind the leaflet stalks of first pair of laterals; terminal leaflet droops.
<i>Flowers</i>	..	White; stigma protrudes; buds dark.

LATE MAINCROP VARIETIES.

"Dobbie's Asset"

<i>Sprout</i>	..	Pink.
<i>Tuber</i>	..	Oval; skin white; flesh white; eyes shallow.
<i>Haulm and Foliage</i>		Medium to tall, with open appearance; stems tinted red-purple; wings broad; leaf rigid and markedly open; leaflets medium green and dull; leaflet stalks long, terminal leaflet well clear of last pair of laterals; midrib of leaf tinted red-purple at base and at bases of leaflet stalks.
<i>Flowers</i>	..	White, profuse; anthers yellow and often twisted; stalks long; buds red-purple.

"Redskin"

<i>Sprout</i>	..	Pink.
<i>Tuber</i>	..	Round; skin pink; flesh white to pale lemon; eyes shallow.
<i>Haulm and Foliage</i>		Upright, tall; stems strong and branching, tinged red-purple; wings straight; leaf open and rigid, midrib tinged red-purple at bases of leaflet stalks; leaflets medium green, dull and small; veins prominent; young leaflets tinged red-purple at bases.
<i>Flowers</i>	..	White, frequent; buds dark.

Publicity for Home-Grown Bulbs, Plants, Shrubs and Cut Flowers

THE value of the bulbs, plants, shrubs and flowers imported into this country in 1933 amounted to over £2 million, and in these days, when many schemes are being promulgated with the object of enabling the home grower of agricultural products to secure a larger share of the home markets, it may well be asked what steps are being taken to encourage a greater demand for these important horticultural products of home origin. It is generally conceded by all sections of the trade concerned that the publicity work that was carried on by the Empire Marketing

MISCELLANEOUS NOTES

Board, on behalf of these home-grown products, proved beneficial to the industry.

With the closing down of the Empire Marketing Board at the end of September, 1933, the question was raised whether this useful work—which largely took the form of displays in the Royal Parks, news items based thereon, catalogues of growers of bulbs and rose trees, and shop window bills—should be allowed to lapse. Influential members of the industry were decidedly of the opinion that it should be maintained and, if possible, extended. The difficulty confronting them, however, was the absence of any organization, representative of the industry as a whole, that could undertake work of this kind, and they accordingly made representations to the Ministry of Agriculture that this work should be continued, at least temporarily, under the Department's ægis. As a result, a conference was convened in October, 1933, under the chairmanship of Earl De La Warr, Parliamentary Secretary to the Ministry, to consider the proposal.

It was the general desire of that conference, to which were invited the chairmen of the various organizations in the horticultural industry directly or indirectly concerned, that this propaganda work should be continued by the Ministry with the aid of an advisory committee representative of the various sections of the trade until such time as the industry itself could accept full responsibility for publicity of this character. The Ministry intimated its willingness to recommend the Government to approve the proposal, provided promises of financial contributions amounting to a substantial proportion of the funds required for the purpose were forthcoming from the sections of the trade concerned. Negotiations followed with the industry and a number of the principal organizations agreed to contribute the stipulated proportion of the necessary funds.

The Government have now authorized the scheme as a purely temporary measure for a period ending in October, 1934, on the understanding that every effort will be made by the industry to take over the full responsibility by the end of this period.

Sir Lionel Earle, G.C.V.O., K.C.B., formerly Permanent Secretary to His Majesty's Office of Works, has accepted the Minister of Agriculture's invitation to serve as independent chairman of the committee that will advise the Ministry on the conduct of this publicity work. The com-

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position of the committee, which consists of one representative of each of the subscribing organizations, is given on p. 1177.

Some useful preliminary work has already been carried out. The advisory committee met on February 21 and commenced the preparation of a propaganda programme designed to encourage the purchase of home-grown bulbs, shrubs and cut flowers in preference to imported supplies.

Future activities will include the continuation, in co-operation with the Office of Works, of the organization of special displays in the Royal Parks and gardens; negotiations with public and official bodies, both in London and the provinces, with the object of ensuring that preference will be given to home-grown products when they are purchasing supplies for their parks and gardens; and with transport companies, requesting their co-operation in securing the maximum publicity for displays that may be arranged. Special publicity campaigns will no doubt be conducted from time to time in favour of individual kinds of flowers, plants or shrubs, and to encourage the public to buy more English cut flowers. Other possible activities will take the form of the preparation and issue of lists of growers, distributors and varieties of bulbs, rose trees and other shrubs, lectures and displays of cut flowers at suitable exhibitions.

It may be recalled that the striking displays of home-grown bulbs staged in St. James's Park and elsewhere last year, and the lay-out of the new rose gardens in Regent's Park, attracted considerable public attention and resulted in numerous inquiries. These are examples of the kind of work that will be undertaken, and it is hoped that such propaganda will lead to an increasing recognition of the high quality and reliability of the horticultural products of this country, and a corresponding increase in the demand for them.

National Stud

SIR HENRY GREER, K.C.V.O., has resigned his appointment as Director of the National Stud, owing to ill-health, and Mr. Noble B. Johnson, previously Assistant Director, has been appointed to succeed him. Mr. P. E. Burrell has been appointed Assistant Director.

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Export of Breeding Stock

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during the three months ended December, 1933, compared with the corresponding period of 1932. (From returns supplied by H.M. Customs and Excise.)

	Oct. to Dec. 1933		Oct. to Dec. 1932	
	Number	Declared Value	Number	Declared Value
CATTLE		£		£
Argentina	4	1,385	3	260
France	13	515	0	0
Uruguay	5	935	0	0
Australia	50	4,724	29	2,865
British India	12	501	17	993
Canada	41	1,230	35	1,840
Irish Free State	27	833	16	671
Kenya	2	87	13	816
Union of South Africa	41	2,848	29	1,803
Other countries	11	366	22	1,642
Total	206	13,424	164	10,890
SHEEP AND LAMBS				
Argentina	100	1,379	161	1,420
Brazil	3	30	5	65
Chile	41	775	2	40
Egypt	16	90	0	0
Turkey (European)	7	79	0	0
Uruguay	44	665	42	316
Australia	15	595	2	168
Falkland Islands	11	284	4	320
Irish Free State	34	219	127	821
Union of South Africa	50	358	42	297
Other countries	22	152	97	854
Total	343	4,626	482	4,301
SWINE				
France	3	31	2	45
Japan	2	90	0	0
Palestine	1	22	0	0
Poland	11	237	3	37
British India	6	34	2	34
Channel Islands	5	54	0	0
Irish Free State	4	38	0	0
Kenya	5	64	0	0
Union of South Africa	1	30	4	173
Other countries	0	0	11	224
Total	38	600	22	513

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Export of Breeding Stock in 1933

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during 1933, with comparative figures for 1932. (From returns supplied by H.M. Customs and Excise.)

	1933		1932	
	Number	Declared Value	Number	Declared Value
CATTLE				
Argentina	71	£ 16,115	92	£ 12,215
Brazil	11	340	1	90
France	13	515	7	260
Russia	0	0	353	13,388
Uruguay	17	1,908	12	1,190
Australia	71	7,336	41	6,795
British India	12	501	18	1,013
Canada	59	3,051	112	6,486
Irish Free State	316	6,546	530	12,771
Kenya	13	557	34	2,105
Southern Rhodesia	5	517	4	579
Union of South Africa	50	3,698	70	6,314
Other countries	28	1,323	71	2,939
Total	666	42,407	1,345	66,145
SHEEP AND LAMBS				
Argentina	106	1,398	247	3,065
Brazil	74	1,944	13	247
Chile	71	1,785	2	40
Uruguay	47	695	59	551
Australia	23	1,076	13	788
Canada	17	490	24	549
Falkland Islands	33	617	4	320
Irish Free State	109	786	250	1,239
Kenya	5	218	4	85
Union of South Africa	63	436	45	315
Other countries	114	1,125	356	2,989
Total	662	10,570	1,017	10,188
SWINE				
Argentina	20	150	1	20
Brazil	17	149	4	68
France	15	191	11	156
Italy	5	92	31	155
Japan	38	539	2	100
Poland	22	412	14	142
Australia	5	98	5	185
Channel Islands	46	161	0	0
Irish Free State	44	330	427	2,043
Other countries	48	439	43	811
Total	260	2,561	538	3,680

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The Agricultural Produce Index Number for 1933

THE level of agricultural prices in 1933 was on the whole rather lower than in 1932, the index for the year being 107 (on the base 1911-13 equals 100) or 5 points down. This decline amounts to about $4\frac{1}{2}$ per cent. on 1932, compared with declines of 7 per cent. and 10 per cent. in 1931 and 1930 respectively. The movement of prices in 1933 was moreover generally more normal than that of recent years: a number of products such as milk, eggs, poultry, hay and barley have just about maintained their position and in several instances, notably sheep and pigs, wool and hops there has been a recovery. On the other hand fat cattle, wheat and oats have continued to decline and potatoes have reached a low level. The fall of nearly 50 per cent. in the level for potatoes would in itself have accounted for a fall of 5 points in the general index.

Grain.—Prices of home-grown grain as a rule remained below the pre-war level during most of 1933. Wheat in January averaged 5s. 3d. per cwt. against 5s. 10d. in the corresponding month of 1932, and although there was a comparatively sharp rise in the next six months to an average of 6s. 7d. per cwt. in July, the new crop harvested in August, 1933, sold at considerably lower prices than in 1932. The average in December, 1933, was only 4s. 6d. per cwt. and the average of 5s. 4d. for the year was the same as for the low record year 1894. If, however, allowance is made for the "deficiency payment" to farmers under the Wheat Act of 1932, the index of 70 shown for 1933 would be increased to approximately 132, and the general index for agricultural produce would rise from 107 to 111. The average for barley in 1933 was 7s. 11d. per cwt. or 4d. more than in 1932: the rise was accounted for by the comparatively high prices realized for the excellent new crop of 1933, as in the first half of the year the remnant of the old crop of 1932 sold at an average of about 6s. 6d. per cwt. The annual index for barley at 100 was the same as in 1930 and 1931. Values for home-grown oats were fairly stable in 1933, the level showing a gradual decline from 6s. per cwt. in February to 5s. 3d. in December, while the average for the year was 5s. 7d. per cwt. or only 3d. more than the record low level in 1896. The index for the year was 20 per cent. below pre-war.

Fat Stock.—The prices of fat sheep and pigs showed a recovery from the very low levels of 1932. Following upon

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the temporary measures for the improvement of the live-stock trade taken by the Government towards the close of 1932 there was an appreciable rise in prices of nearly all classes of live stock and meat, and this was accentuated by the normal rise in values which occurs at the Christmas season. In January, 1933, the level of prices for fat cattle, sheep and pigs was well above that of the low point of October and November, 1932.

In the case of fat cattle, however, the January average price of 37s. 6d. per live cwt. for second quality was 3s. short of that in the previous January and instead of prices showing their usual seasonal rise they commenced to fall, and in May, 1933, the average was only 35s. 9d. per live cwt. or 8s. 6d. lower than in May, 1932. The decline continued until September and the averages for September to November at 33s. 3d. were nearly 1s. below those of the lowest point in 1932, while values in December, 1933, were 1s. 6d. lower than in the previous December. Over the year as a whole values for fat cattle were 12 per cent. lower than in 1932.

With sheep the position was very much improved: the rise in the autumn of 1932 had brought prices in January, 1933, to a level almost equal to that of the previous January and by March the prices of second quality sheep had advanced 1½d. per lb. to 9½d. and were 1d. above those of March, 1932. The subsequent seasonal decline reduced prices to 7½d. per lb. in September, but they rose again and in December, 1933, the average of 8½d. was 1½d. more than in the previous December. The index of 110 for 1933 showed a rise of 13 per cent. over 1932.

The increase in fat pig prices in 1933 was almost as marked as in the case of sheep. The three previous years, 1930 to 1932, covered the downward movement of a pig "cycle," whereas in 1933 the upward movement had begun. The main feature of the 1933 prices was the recurrence of the clearly defined seasonal changes which should normally take place: thus in the case of pork pigs the average prices of second quality rose from their lowest point of 9s. per score in July, 1932, to 12s. 6d. in March, 1933, fell again to about 9s. 6d. in July and rose continuously and sharply thereafter to 13s. 9d. in December. Similarly second quality bacon pigs rose from about 8s. 6d. per score in September, 1932, to 11s. 3d. in April, 1933, fell to 9s. 3d. in July and then advanced to nearly 11s. in December.

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The annual index for pork pigs in 1933 at 109 showed an increase of 11 per cent. over 1932 and the index for bacon pigs at 102, an increase of 12 per cent.

Dairy and Poultry Produce.—Milk prices in 1933 were governed in the first nine months by the terms negotiated by the Permanent Joint Milk Committee and in the last three months by the contract arrangements prescribed by the Milk Marketing Board. The prices obtained by producers were on the whole rather better than in 1932 and also slightly above those obtained in 1931, the index number for 1933 being 150 compared with 144 in 1932 and 147 in 1931. There was no exceptional feature to record for English farm butter values: the index at 94 was 8 per cent. lower on the year, thus showing a continuation of the gradual decline which had been evident in the past four years. The average for second quality in January, 1933, was 14s. 3d. per 12 lb. or 1s. 9d. lower than in the previous January, and at its minimum of 10s. 3d. in the early summer it was 9d. lower than in the previous summer, but the rise to 14s. 6d. in December has brought the average to within 3d. of the average for December, 1932. Cheese also was cheaper than in 1932, the index at 111 showing a fall of 13 per cent. In 1932, however, values were high during the first half of the year, but in the second half of 1932 they dropped to a comparatively low level. The downward tendency continued throughout most of 1933 and in October values were lower than for many years, while in the remaining months of November and December there was a slight rise. The annual index of egg prices in 1933 was 105 against 109 in 1932 and 116 in 1931. No very remarkable deviation from the normal occurred in 1933, although it is noticeable that while the lowest monthly average of 7s. 1d. per 120 for second quality was 10d. below the lowest month of 1932, the highest monthly average of 19s. 2d. in November was only 7d. short of the previous year. The annual average was only 5d. lower. Poultry as a whole realised prices very similar to those obtained in 1932, the index being only 2 points lower at 126. This reduction was due to fowls and geese: both were a little cheaper throughout the greater part of the year and sold at comparatively low prices in December, 1933.

Other Commodities.—In the case of potatoes the year under review was unusual on account of the persistently low level of prices. The crops of 1932 and 1933 were both over

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average, especially 1932, and prices for the period April to September, 1933, comprising the end of the 1932 crop and the beginning of the 1933 crop, were below the pre-war level. The average price for the year was only 4 per cent. above pre-war and only 8 per cent. above the previous very low year 1930. Fruit and vegetables were also cheaper in 1933 than in 1932, fruit being reduced 20 per cent. and vegetables about 8 per cent. Apples, cherries, gooseberries and plums were the principal kinds of fruit affected, plums especially being cheap. Onions showed the greatest reduction in the vegetable group.

The index for hay, after three years' successive decline to the very low figure of 69 in 1932, has shown a slight increase, due to the upward trend in prices following upon the short crop harvested this last year. Hops have made a further recovery from the exceptionally poor prices realized in 1929 to 1931, the index of 175 for 1933 being 66 per cent. higher than in 1932: the average price of the hops of the 1933 crop was approximately £15 per cwt. A substantial increase in wool prices occurred during 1933 and the index, based on values realized at the country wool sales, rose from 45 in 1932 to 66 in 1933, or 47 per cent.

Index numbers of Agricultural Produce during the years 1928 to 1933. (Mean of the three years, 1911-13 = 100.)

Commodity	1928	1929	1930	1931	1932	1933
Wheat ...	132	130	105	76	78	70
Barley ...	139	125	100	100	96	100
Oats ...	147	125	87	88	99	80
Fat cattle ...	138	133	133	122	115	101
Fat sheep ...	167	157	160	133	97	110
Pigs, baconers ...	135	160	153	107	91	102
Pigs, porkers ...	138	165	165	123	98	109
Hay ...	111	125	118	86	69	70
Potatoes ...	171	117	96	188	197	104
Milk ...	161	169	161	147	144	150
Butter ...	151	152	128	111	102	94
Cheese ...	173	158	130	116	127	111
Poultry ...	149	152	147	144	128	126
Eggs ...	146	159	136	116	109	105
Fruit ...	183	159	117	132	180	143
Wool ...	176	126	82	52	45	66
Beans and peas ...	133	135	100	74	76	72
Vegetables ...	176	164	138	140	153	141
Hops ...	126	51	47	77	105	175
General Index ...	147	144	134	120	112	107

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The Agricultural Index Number

THE January index number of the prices of agricultural produce at 114 was 4 points higher than a month ago. As is usual at this period, the increase was due primarily to the fact that the prices in January, 1911-13, were mostly lower than in December of those years. The January index number is, however, 7 points higher than the figure for January, 1933.

Monthly index number of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1929.	1930.	1931.	1932.	1933.	1934.
January	145	148	130	122	107	114
February	144	144	126	117	106	—
March	143	139	123	113	102	—
April	146	137	123	117	105	—
May	144	134	122	115	102	—
June	140	131	123	111	100	—
July	141	134	121	106	101	—
August	152	135	121	105	105	—
September	152	142	120	104	107	—
October	142	129	113	100	107	—
November	144	129	112	101	109	—
December	143	126	117	103	110	—

Grain.—Wheat sold at an average of 4s. 4d. per cwt. during January or 2d. less than in the previous month, and the index fell 2 points to 59. If, however, allowance is made for the “deficiency payment” under the Wheat Act of 1932, the index would be increased to approximately 136 and this would have the effect of raising the general index for agricultural produce from 114 to 119. (Revised index numbers on this basis are shown at the foot of the table opposite.) The quotations for barley and oats were 2d. and 3d. higher at 9s. 4d. and 5s. 6d. per cwt. respectively and the relative indices rise by 6 and 5 points to 117 and 80.

Live Stock.—Increased prices were realized for all descriptions of fat stock during January, which is in accordance with the usual seasonal trend. An advance of about 1s. 6d. per live cwt. was recorded in the average price of second quality fat cattle and the index was 9 points higher at 106, while an increase of $\frac{1}{4}$ d. per lb. in the average for fat sheep was reflected in the rise of 11 points in the index to 117. Bacon pigs were 11d. and pork pigs 4d. per score lb. dearer and the indices moved upwards 16 and 10 points respectively to 125 and 136. A decline of nearly £1 per head in the value of dairy cows was relatively larger than that which occurred in the corresponding period of the

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MONTHLY INDEX NUMBER OF PRICES OF INDIVIDUAL COMMODITIES. (CORRESPONDING MONTHS OF 1911-13=100.)

Commodity	1932	1933				1934
	Jan.	Jan.	Oct.	Nov.	Dec.	Jan.
Wheat	80	72	65	61	61	59
Barley	103	87	120	110	111	117
Oats	102	84	78	76	75	80
Fat cattle... ..	119	110	99	100	97	106
„ sheep... ..	110	107	107	110	106	117
Bacon pigs	96	99	97	104	109	125
Pork „	110	110	110	118	126	136
Dairy cows	123	113	114	107	106	105
Store cattle	121	107	89	85	85	90
„ sheep	100	83	86	90	86	93
„ pigs	127	121	139	144	147	163
Eggs	107	94	112	108	99	97
Poultry	127	121	122	120	110	115
Milk	154	155	157	161	166	166
Butter	108	97	98	95	97	92
Cheese	122	119	103	105	106	114
Potatoes	303	116	110	115	112	104
Hay	75	65	74	78	80	79
Wool	80	64	79	81	84	95

Revised index numbers due to Wheat Act payments.

Wheat	—	134	135	133	136	136
General Index	—	111	112	114	115	119

base years and the index was one point lower at 105. Store cattle, however, realized about 5s. per head more and were 10 per cent. cheaper than pre-war, as against 15 per cent. in December. Both store sheep and pigs sold at higher prices during January and the index for the former was 93 as against 86 in the previous month, while that for pigs was 163 against 147.

Dairy and Poultry Produce.—The regional contract prices for milk in January were the same as in December and the index was unaltered at 166. Cheese averaged about 2s. 6d. per cwt. more and the index appreciated 8 points to 114. Butter, however, was 1d. per lb. cheaper and declined 4 points to 92, while a fall of 5d. per dozen in the value of eggs was proportionately greater than that which occurred in January, 1911-13, and resulted in the index falling 2 points to 97. A year ago the index for eggs was 94. Both fowls and ducks became slightly dearer during January and

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the combined index for poultry was 115 as against 110 in December.

Other Commodities.—There was only a slight drop in the average price of potatoes but as a rise occurred in January of the base period the index fell 8 points to 104. In the case of hay also, prices were practically unaltered on the month, but the index was reduced one point to 79. All descriptions of vegetables became dearer during January, especially green vegetables, and the index was about double pre-war. The advance in wool values which has been apparent since June last continued during January and the index for January was 95 or 32 points higher than in June.

International Congress of Agriculture, Budapest, 1934.—The Sixteenth International Congress of Agriculture, organized by the International Commission of Agriculture, will be held at Budapest next June, under the patronage of H.S.H. Admiral Nicolas Horthy de Nagybanya, Regent of Hungary. According to present arrangements the Congress will be opened on June 14 by Dr. Charles Schande, President of the Organizing Committee, and will close on June 20. The subjects for discussion will include agricultural education, co-operation, live-stock production, organization of the dairy industry, rural crafts and industries, rural economy, rural housing, viticulture, and the place of women in agriculture. Membership will consist of members of the International Commission of Agriculture, delegates from agricultural associations, technical or scientific institutes concerned with agriculture, and individual members. Full information regarding the Congress may be obtained from Dr. N. de Siegescu, Secretary to the Organizing Committee, Budapest, Hungary.

German Agricultural Exhibition, Erfurt, 1934.—The Fortieth Annual Exhibition, organized by the German Agricultural Society, will be held at Erfurt from May 29 to June 3 of this year. As at previous shows, practically every branch of the industry will be represented, including artificial fertilizers, canned goods, cattle, dairying, goats, horses, horticulture, poultry, small holdings, timber, tobacco and viticulture. There will also be exhibits illustrating agricultural labour and machinery, advertising, co-operative trading, domestic economy, educational material, experiments, housing and radio apparatus. A reduced fee will be charged for foreigners requiring a German *visa* on their passports. Full particulars regarding accommodation, travel routes, and all other matters relating to this exhibition may be obtained on application to the Secretary, Deutsche Landwirtschafts-Gesellschaft, Dessauerstrasse 14, Berlin, S.W.11.

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at 7, Whitehall Place, London, S.W.1, on February 13, 1934, Mr. W. B. Yates, C.B.E., J.P., presiding. The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Bedfordshire and Huntingdonshire.—An Order fixing minimum and overtime rates of wages to come into force on February 25, 1934 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until February 23, 1935. The minimum rates in the case of male workers of 21 years of

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age and over are 30s. 6d. per week of 41 hours (instead of 42½ as at present) in the weeks in which Easter Monday and Whit Monday fall; 50 hours (instead of 52 as at present) in any other week in summer; 31 hours (as at present) in the week in which Christmas Day and Boxing Day fall, and 48 hours (as at present) in any other week in winter, with overtime unchanged at 9d. per hour on weekdays and 10d. per hour on Easter Monday, Whit Monday, Christmas Day and Boxing Day, and 11d. per hour on Sundays. The minimum rate for female workers of 18 years of age and over is 6d. per hour with overtime at 7½d. per hour on weekdays, 8½d. per hour on Easter Monday, Whit Monday, Christmas Day and Boxing Day, and 9d. per hour on Sundays, these rates being unchanged.

Kent.—An Order fixing minimum and overtime rates of wages to come into force on March 4, 1934 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until March 30, 1935. The minimum rates in the case of male workers of 21 years of age and over employed wholly or mainly as horsemen, stockmen or shepherds are unchanged at 33s. per week of 42½ hours in the weeks in which Good Friday and Christmas Day fall and 52 hours in any other week, with, in addition, 8d. per hour for all employment on customary duties in excess of these hours up to 60 hours per week. The minimum rates in the case of other male workers of 21 years of age and over are unchanged at 32s. 6d. per week of 42½ hours in the week in which Good Friday falls, 52 hours in any other week in summer, 39 hours in the week in which Christmas Day falls, and 48 hours in any other week in winter. The overtime rates in the case of all classes of male workers of 21 years of age and over are 9d. (instead of 8d. as at present) per hour on weekdays and 10d. (instead of 9d. as at present) per hour on Sundays, Good Friday and Christmas Day, except that the overtime rate payable to horsemen, stockmen and shepherds whilst employed on their customary duties is 9d. per hour (instead of 8d. as at present). The minimum rate for female workers of 18 years of age and over is 6d. per hour (instead of 5½d. as at present), with overtime at 6½d. per hour on weekdays and 7½d. per hour on Sundays, Good Friday and Christmas Day (instead of 6d. and 6½d. per hour respectively as at present).

Lincolnshire (Kesteven and Lindsey).—An Order continuing the operation of the existing minimum and overtime rates of wages from March 5, 1934 (i.e., the day following that on which the existing rates are due to expire), until March 3, 1935. The minimum rates in the case of male workers of 21 years of age and over are: waggoners 37s. per week of 52½ hours in the weeks in which Good Friday and Christmas Day fall, 61 hours in any other week from October 15 to May 13, and 58 hours in any other week during the remainder of the year; shepherds 35s. per week of 45½ hours in the week in which Good Friday falls, 55 hours in any other week in summer, 47½ hours in the week in which Christmas Day falls and 56 hours in any other week in winter, with additional payment for the lambing season; stockmen 36s. per week of 46½ hours in the week in which Good Friday falls, 56 hours in any other week in summer, 49½ hours in the week in which Christmas Day falls and 58 hours in any other week in winter, and for other male workers 30s. per week of 43½ hours in the week in which Good Friday falls, 53 hours in any other week in summer, 39½ hours in the week in which Christmas Day falls and 48 hours in any other week in winter, with overtime in the case of all classes of male workers at 9d. per hour on weekdays and 11d. per hour on Sundays. For female workers of

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17 years of age and over the minimum rate is 5½*d.* per hour for all time worked.

Middlesex.—An Order continuing the operation of the existing minimum and overtime rates of wages from March 4, 1934 (i.e., the day following that on which the existing rates are due to expire), until March 2, 1935. The minimum rates for male workers of 21 years of age and over are 41*s.* 3*d.* per week of 60 hours in the case of stockmen, 38*s.* 6*d.* per week of 56 hours in the case of carters, 34*s.* 4½*d.* per week of 50 hours in summer and 33*s.* per week of 48 hours in winter for other whole-time workers, and 8½*d.* per hour for casual workers, with overtime in each case at 10½*d.* per hour. For female workers of 18 years of age and over the minimum rates are 30*s.* per week of 60 hours for workers employed on the duties of stockmen; 28*s.* per week of 56 hours for carters, 25*s.* per week of 50 hours in summer and 24*s.* per week of 48 hours in winter for other whole-time workers, and 6*d.* per hour for casual workers, with overtime at 7½*d.* per hour in all cases.

Monmouthshire.—An Order continuing the operation of the existing minimum and overtime rates of wages from March 16, 1934, (i.e., the day following that on which the existing rates are due to expire), until September 15, 1934. The minimum rates for male workers of 21 years of age and over are 31*s.* per week of 54 hours, with overtime at 9½*d.* per hour on weekdays and 11½*d.* per hour on Sundays, Good Friday, Easter Monday, Whit Monday and August Bank Holiday. For female workers of 17 years of age and over the minimum rate is 6*d.* per hour for all time worked.

Northants and Soke of Peterborough.—An Order fixing minimum and overtime rates of wages to come into force on March 5, 1934 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until October 27, 1934. The minimum rates for male workers of 21 years of age and over are 30*s.* per week of 41 hours (instead of 42½ as in 1933) in the weeks in which Easter Monday and Whit Monday fall and 50 hours (instead of 52 as in the summer of 1933) in any other week, with overtime at 9*d.* per hour on weekdays and 11*d.* per hour on Sundays, Easter Monday and Whit Monday. The minimum rate for female workers of 18 years of age and over is 6*d.* per hour, with overtime at 7½*d.* per hour on weekdays and 9*d.* per hour on Sundays, Easter Monday and Whit Monday, these rates being unchanged.

Northumberland.—An Order fixing minimum and overtime rates of wages to come into force at noon on May 13, 1934 (i.e., when the existing rates are due to expire), and to continue in force until noon on May 13, 1935. The minimum rates for male workers of 21 years of age and over employed as stewards, horsemen, cattlemen, stockmen or shepherds and hired by the week or longer period are unchanged at 37*s.* 6*d.* in the case of workers who are householders, and 34*s.* 6*d.* in the case of workers who are not householders, per week of customary hours (not exceeding 62). For other male workers of 21 years of age and over (except workers in casual employment) the minimum rate remains unchanged at 30*s.* 6*d.* per week of 48 hours in winter and 52½ hours in summer, overtime being payable in the case of all regular male workers at the rate of 9*d.* per hour on weekdays and 11*d.* per hour on Sundays. The minimum rate for casual male workers of 18 years of age and over remains unchanged at 7*d.* per hour for all time worked. For female workers of 18 years of age and over the minimum rates remain unchanged at 5*d.* per hour in the case of regular workers and 3*d.* per hour in the case of casual

MISCELLANEOUS NOTES

workers, with overtime at 6*d.* per hour and 4*d.* per hour respectively. The minimum rates fixed for male workers of 19 and under 21 years of age are 1*s.* per week higher than those at present in operation.

Worcestershire.—An Order fixing minimum and overtime rates of wages to come into force on March 4, 1934 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until March 3, 1935. The minimum rates for male workers of 21 years of age and over are 30*s.* per week of 44½ hours (instead of 45 as formerly) in the week in which Good Friday falls, 53½ hours (instead of 54 as formerly) in any other week in summer, 39½ hours in the week in which Christmas Day falls and 48 hours in any other week in winter (instead of 48 hours per week up to February 4, 1934, and 50 hours per week during the remainder of the winter period), with overtime at 8*d.* per hour throughout the whole period (instead of 7*d.* per hour until November 4, 1933, and 7½*d.* per hour from November 5, 1933 until March 3, 1934). For female workers of 18 years of age and over the minimum rate is 5*d.* per hour, with overtime on Sundays and in excess of 8 hours on any other day at 5½*d.* per hour (instead of 5*d.* per hour for all time worked).

Glamorgan.—An Order fixing minimum and overtime rates of wages to come into force on March 2, 1934 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until March 1, 1935. The minimum rates for male workers of 21 years of age and over employed wholly or mainly as stockmen, cattlemen, cowmen, horsemen, shepherds or bailiffs are 37*s.* (instead of 36*s.* as at present) per week of 60 hours, with overtime unchanged at 10*d.* per hour, and for other male workers of 21 years of age and over 33*s.* 6*d.* (instead of 32*s.* 6*d.* as at present) per week of 52 hours in summer and 48 hours in winter, with overtime unchanged at 9*d.* per hour on weekdays and 10*d.* per hour on Sundays. For female workers of 18 years of age and over the minimum rate remains unchanged at 6*d.* per hour, with overtime rates also unchanged at 7*d.* per hour on weekdays and 7½*d.* per hour on Sundays.

Enforcement of Minimum Rates of Wages.— During the month ended February 14 legal proceedings were taken against six employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
		£ s. d.	£ s. d.	£ s. d.	
Hereford ...	Ross ...	10 0 0	—	54 6 4	2
Nottingham	Nottingham	5 0	—	35 0 0	1
Do.	Do.	10 0	10 0	13 9 6	2
Sussex ...	Chichester	10 0 0	3 3 0	4 4 6	1
Do.	Haywards	5 5 0	—	13 6 6	4
	Heath				
Yorks, W.R.	East Ainsty	1 0 0	2 0	28 10 2	1
		£27 0 0	£3 15 0	£148 17 0	11

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Cornwall. — Miss D. E. Nicholas has been appointed Temporary Assistant Instructor in Dairying.

Oxford. . Mr. W. C. Ibbett, N.D.H., has been appointed Instructor in Horticulture, *vice* Mr. S. Heaton, retired.

Yorkshire. —Mr. C. E. Hudson, N.D.H., has been appointed Lecturer in Horticulture.

Mr. R. D. Scott, N.D.P., has been appointed Instructor in Poultry Husbandry, *vice* Miss M. G. Spurr, N.D.P.

Miss N. C. Butchart, N.D.D., B.D.F.D., has been appointed Instructor in Rural Economy, *vice* Miss W. E. Jolley, D.S.D.

WALES

Caernarvonshire. —The death is announced of Mr. J. Rowlands, Instructor in Bee-keeping.

NOTICES OF BOOKS

Mushrooms: How to Grow Them. By W. Falconer. Pp. 169 and 29 Figs. (New York: Orange Judd Publishing Co. London: Kegan Paul, Trench, Trubner & Co., Ltd. 1932. Price 13s.)

Like the second and subsequent issues of Falconer's manual on mushrooms, this is a straight reprint of the book as it originally appeared in 1891. In previous reprints, however, the year of the original publication has been clearly indicated by the date of the author's preface, and also by a note on the back of the title-page. Both these references are omitted from the present reprint, which yet gives the date on the title-page as 1932, thus creating the impression that a reprint of a book published forty-one years ago is a modern work. In view of its age alone this publication does not contain data relative to modern developments concerning houses, spawn, marketing, etc.

Report on the Poultry Industry in Scotland. Pp. 47. (Glasgow: Scottish National Development Council, 39, Elmbank Crescent. 1933. Price 6d.)

The Agricultural Committee, appointed by the Scottish National Development Council to survey the present position of Scottish agriculture, has pursued its investigations by means of specialist sub-committees dealing with various branches of the industry. This report, prepared by the Poultry Sub-Committee, describes the present position and recent rapid progress of Scottish poultry husbandry, which now plays an important part in the agricultural operations of the country. During the last 20 years, the production of eggs on Scottish farms has been doubled, and there would seem to be no reason why the development should not continue, provided the price level offers sufficient inducement to the poultry-keeper. In various sections, the Report records the number and distribution of the birds, the output and value of the home produce; import figures; internal consumption; costs of production, and of education and research in poultry-keeping; and the relation between arable farming and the poultry industry. A concluding section embodies the recommendations of the main Agricultural Committee, and this will be read with interest by poultry-keepers and breeders on both sides of the Border.

ADDITIONS TO THE LIBRARY

Modern Fruit Growing. By W. P. Seabrook. 4th ed. Pp. xi + 292; 59 figs. (London: Ernest Benn, Ltd. 1933. Price 7s. 6d.)

That this manual, first published in 1918, has now reached a fourth (revised and enlarged) edition is some indication of appreciation by the particular section of the public for which it was written. The methods and practices described in it are those employed on the commercial fruit farms, in Essex, belonging to the author's firm; and the cost statements given are those incurred in planting certain orchards of which the acreage is clearly stated. Such information is exceedingly valuable to all those who contemplate embarking on fruit cultivation. The importance of producing fruit of high grade, comparable with the world-standard, is stressed, and the author gives directions in regard to manuring and spraying that should ensure that result. Methods of grading, packing and marketing are described in detail, and are well illustrated. The book should be read by all fruit growers, for the information given is practical and thoroughly up to date.

ADDITIONS TO THE LIBRARY

Horticulture

Empire Marketing Board.—E.M.B. 65:—Fruit Supplies in 1932, (including Vegetables, Flowers and Bulbs.) (140 pp.) London: H.M. Stationery Office, 1933, 1s. [63.41:38; 63.51:38; 63.522.]

Scottish National Development Council.—Economic Series No. 4:—Report of Committee on the Fruit and Vegetable Industry in Scotland. (38 pp.) Glasgow, 1933, 6d. [63.41(41); 63.51 41.]

Morton, J. W.—Fruit and Vegetable Growing for Canning. What is wanted and how to produce it. (44 pp.) London: Fenland Press, 1933, 1s. [63.41(42); 63.51(42).]

Mathin, T. D.—The Retailer's Guide to Fruit Marking. (48 pp.) Covent Garden: Retail Fruiterers' and Florists' Association, 1933, 1s. [343.53; 63.41:38.]

University of Bristol Research Station, Campden.—Misc. Publication No. 2:—The Canning of Solid Pack Apples, by F. Hirst and W. B. Adam. (12 pp.) Campden, 1933. [664.8; 664.85.]

Lambert, L. F.—Cultivation of the Mushroom. (58 pp.) Published by the Author at Coatesville, Penna., U.S.A., 1933, \$1.00. [63.518.]

Cubbon, M. H. and Markuson, M. J.—Soil Management for Green-keepers. (152 pp. + 3 pl.) Amherst: Mass. State College, 1933. [63.521; 63.11.]

National Institute of Agricultural Botany.—Varieties of Potatoes with their Synonyms, immune from and susceptible to Wart Disease. (35 pp.) Revised Edition. Cambridge, 1933, 2s. [63.512-194.]

Rigg, C. H.—Roses of Quality. (94 pp + 6 pl.) London: Benn, 1933, 6s. [63.522.]

Fox, Helen M.—Gardening with Herbs; for Flavour and Fragrance. (334 pp.) New York and London: Macmillan, 1933, 18s. [63.345; 63.348.]

Plant Pests and Diseases

Smith, K. M.—Recent Advances in Plant Viruses. (xii + 423 pp. + 1 pl.) London: J. and A. Churchill, 1933, 15s. [63.23.]

Goodey, T.—Plant Parasitic Nematodes and the Diseases they Cause. (xx + 306 pp.) London: Methuen, 1933, 21s. [63.27.]

Heald, F. D.—Manual of Plant Diseases. Second Edition (xii + 953 pp.) New York and London: McGraw-Hill Book Co., 1933, 45s. [63.2.]

ADDITIONS TO THE LIBRARY

Barger, G.—Ergot and Ergotism. A Monograph based on the Dohme Lectures delivered in Johns Hopkins University, Baltimore. (xvi + 279 pp. + 5 pl.) London and Edinburgh: Gurner & Jackson, 1931, 15s. [63.24; 619.]

Jersey, States Experimental Station.—Rapport de la délégation du Comité d'agriculture, sur sa visite aux régions infectées par le Doryphore (Colorado Beetle) en France, avec acte dudit Comité, y relatif. (25 pp.) Jersey, 1933, 6d. (Report written in English.) [63.27.]

Liv Stock

War Office (Veterinary Dept.)—Animal Management, 1933. (379 pp.) London: H.M. Stationery Office, 1933, 3s. 6d. [63.61.]

Lloyd, E. W. (Edit.)—The Southdown Sheep. (92 pp. + 13 pl.) Chichester: Southdown Sheep Society, 1933. [63.631.]

Scottish National Development Council.—Economic Series: No. 6, Scottish Agriculture. Report of Committee on Sheep Farming Industry in Scotland. (60 pp.) Glasgow, 1933, 6d. [63.631 (41).]

West of Scotland Agricultural College.—Bulletin No. 128:—Cattle Feeding. Relative Values of Swedes, Potatoes, Dried Sugar Beet Pulp and Silage in Beef Production, by *W. G. R. Paterson* (pp. 277-299.) Glasgow, 1933. [63.62:043.]

Dairying

University of Oxford, Agricultural Economics Research Institute.—Open-Air Dairying. A Survey of Farms Using Milk Bails in 1932, by *R. N. Dixey* and *M. Messer*. (78 pp. + 6 pl.) Oxford at the Clarendon Press, 1933, 2s. 6d. [63.7(42).]

Empire Marketing Board.—E.M.B. 66:—Dairy Produce Supplies in 1932 (including Poultry and Pig Products). (131 pp.) London: H.M. Stationery Office, 1933, 1s. [63.7; 63.64; 63.65.]

Poultry and Small Live Stock

Lahaye, J. et Marcq, J.—Traité complet d'aviculture. (511 pp.) Gembloux: J. Duculot; Paris: Librairie Agricole de la Maison Rustique, 1933. [63.65.]

Scottish National Development Council.—Economic Series: No. 1, Scottish Agriculture. Report of Committee on the Poultry Industry in Scotland. (47 pp.) Glasgow, 1933, 6d. [63.65 (41).]

Institut International d'Agriculture.—L'aviculture dans le monde. 3 vols. (272 + 287 + 263 pp.) Rome, 1933, 50 lire. [63.65.]

Bayon, H. P.—Diseases of Poultry. (155 pp.) "Feathered World," 1933, 3s. 6d. [619.5.]

Washburn, F. L.—The Rabbit Book. (200 pp.) Second Edition. Philadelphia and London: J. B. Lippincott Co., 1933, 8s. 6d. [63.69.]

Veterinary Science

Medical Research Council.—Special Report Series No. 184:—The Eradication of Bovine Tuberculosis, by *L. Jordan*. (104 pp.) London: H.M. Stationery Office, 1933, 2s. [614.54.]

Imperial Bureau of Agriculture Parasitology.—The Bursate Lungworms of Domesticated Animals by *T. W. M. Cameron*. (36 pp.) St. Albans, 1933, 5s. [59.169.]

Meat

Line, E. C.—The Science of Meat and Biology of Food Animals. Vol. II. (viii + 279 pp.) London: Meat Trade's Journal. 1932, 7s. 6d. [575; 612; 614.31; 63.751.]

Hartisch, Y.—Die Fleischversorgung Grossbritanniens. (105 pp.) Berlin, 1933, RM.4. [63.75.]

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